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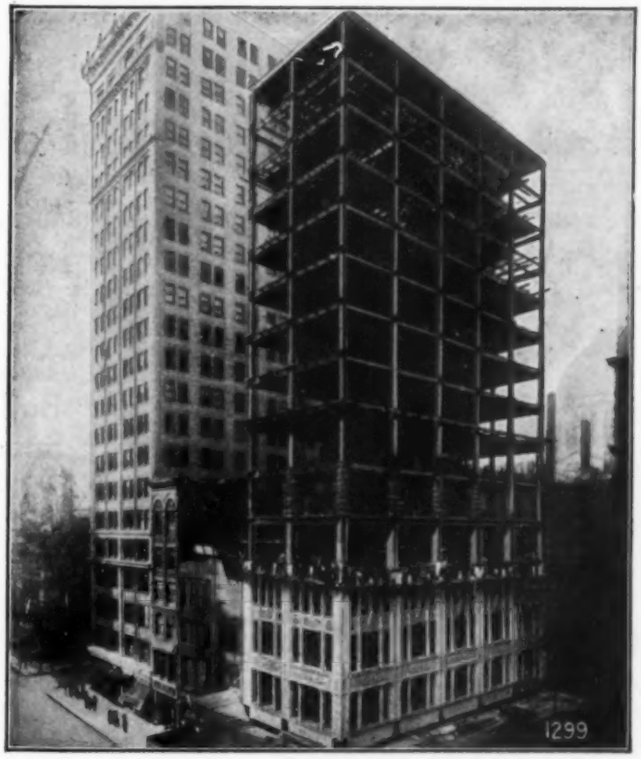

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THE IRON TRADE REVIEW

Vol. LXI Cleveland, July 5, 1917 *No. 1*

Industry Awaits Government Action

Conflicting Views in Cabinet Over Price Action Further Unsettles Situation and Keeps Producers and Consumers in Suspense—Market More Rational—Pig Iron Makers Prepare to Supply War Needs

ALL EYES in the iron and steel trade continue to be focused on Washington for some guidance in a wholly unprecedented situation of market extravagances and war complications. Individual policies of further buying and selling hang upon a surer grasp of both the form and the substance of approaching federal procedure. The week has intensified rather than ameliorated the uncertainty and cross currents into which the industry has been plunged. With harmony yet to be brought to the President's own cabinet, as to the proper course of action toward the basic materials of industry, the outlook is more obscured at best. What appeared to be in the case of coal and, as follows, of coke, the establishment of a precedent applicable to iron and steel has resulted only in new differences over the shades of authority of advisory boards and the legal limits of collective adjustments. More emphasis is being laid on cost investigations now in progress for the solution of the problem of price determination.

Market in Waiting State

Under these conditions the iron and steel industry continues to drift. Both consumers and producers see little to be gained by continuing the headlong buying and selling of the recent past. The futility of piling up forward obligations the shipment of which will depend entirely upon the extent of the government requirements is becoming more widely recognized. The result is the market for finished steel is less erratic. Government buying is proceeding steadily and enough is known to show that the magnitude of this is very large.

Pig Iron is Calmer

Pig iron makers at a general meeting in New York last week made preliminary arrangements to furnish such requirements as the government recently has been inquiring for or may put out later. Negotiations are to be conducted through a general committee. The market is making a more rational showing. Sales have fallen away, but this has been due more to the lack of free supply than of purchasing desire, for many inquiries still are going unsatisfied. Various policies are being pursued by buyers. Some with uncovered requirements to midyear of 1918 are more disposed to take their chances by holding off especially in view of the talk of price fixing by the government, both for itself and the outside trade. On the other hand, a Chicago melter has closed for 5000 tons for the last half of 1918 at $52, Chicago, representing the first definite sale for that period. Various users of cast products are finding themselves obliged to furnish metal to the foundry if they are to obtain needed supplies in time. Prices are more stationary with $55, furnace, the common figure for various northern districts in basic, malleable and foundry. Some Virginia foundry is being sold at $52, furnace. A retrospect of the remarkable upward rush of prices in June is afforded by the monthly sales averages which show $53.26, valley, in bessemer and $49.14 in basic. These represent advances of $7.27 and $7.25, respectively. No previous month in history has such a rise.

Pig iron production in June showed the normal loss over May because of the shorter month. The total was 3,332,509 tons, compared with 3,413,677 tons in May. Of the reduction of 81,168 tons, 60 per cent was in merchant output, indicating more irregular operations because of fluctuating coke supply.

Scrap Down, Coke Soars

Scrap is showing a genuine price recession. Heavy steel is off $2 to $3 in various districts and other grades as much as $5. Buying is much quieter. Coke has taken on all the pyrotechnics of rapid price action where pig iron and scrap have left off. The hitherto unapproached prices of $16 and $16.50, Connelsville ovens, have been paid for spot furnace coke. Contract foundry coke has commanded $14, ovens.

Hysterical reports of a Teutonic plot to check the flow of raw materials to the country's iron and steel plants by obstructing Great Lakes channels, are completely discounted. On the same day that these reports appeared, announcement was made of the record-breaking June or shipments.

Army and Navy Needs Goad Builders

Gunmakers and Munition Plants Raise Cry for Tools While Shipyards on Both Coasts Buy Equipment With Prodigal Hand—Steel Mills Enter Buying Field With Heavy Lists

AMERICA'S preparations for war exerted a steadily increasing influence in the machinery markets during June. Pressure for equipment directly or indirectly essential to the conduct of the war was the supreme feature of the month's markets. The scope of the demand thus created was extremely broad, as the government's requirements for ships, guns, aeroplanes, shells, motor trucks, tractors and various other munitions has meant increased demand for steel and other raw materials. Hence there has been constant call for equipment for iron and steel works expansion and even for mining equipment for development work.

War Needs Drives All Production Skyward

The big shipbuilding program has meant increased activity for boilermakers and marine engine builders. Pump and condenser manufacturers are experiencing a rush of business because of the heavy sales of marine power equipment. The government's proposed aeroplane program involves purchase of considerable equipment by aeroplane motor builders. The proposed manufacture of thousands of field guns and many batteries of heavy ordnance, to support our new army and to arm our battleships and coast fortifications, has caused the placing of important orders for big lathes and rifle-drilling machinery. The ramifications of the country's war requirements are far-reaching and complex. Capacity for building certain tools has proved far insufficient to supply the pressing demand. Lack of labor is a handicap against considerable increase of machinery building facilities. Also, speed is the vital element and new construction now begun would not be completed for many months. Some machinery builders are working practically to capacity on government work and will be in this position for at least a year. Some orders are known to be on books specifying delivery in 30 months.

Shipyards are Big Factors in Market

One of the important developments in June with a bearing upon the machinery markets was the passage of the war budget bill, authorizing the government to take over ships now under construction and to abrogate contracts, thus clearing the way for the standardized steel ship construction program. By the close of June the Emergency Fleet Corp. had placed contracts for nearly 200 hulls or complete ships, and companies obtaining such contracts appeared as buyers of machinery and cranes. Among the shipbuilders who were active in the machinery market last month were the Baltimore Dry Dock & Shipbuilding company, Baltimore, which bought about 21 cranes and a large quantity of punching and shearing machinery; the Newport News Shipbuilding & Dry Dock Co., which bought nine cranes and entered the market for 14 more, in addition to issuing a list of punching and shearing machinery and radial drills. The Skinner & Eddy Corp., Seattle, Wash., issued a list of shipyard equipment, and the Union Iron Works, San Francisco, closed for $200,000 worth of machine tools for a turbine shop. The Merrill-Stevens Co., Jacksonville, Fla., closed for punching and shearing machinery and other shipyard equipment; the Chester Shipbuilding Co. closed for six locomotive cranes for new ways it will construct at its Chester, Pa., yard; the Maryland Shipbuilding Co. inquired for six 5-ton cranes in connection with a contract it has secured for six wooden ships; the Terry Shipbuilding Co. closed for shipyard machinery for a yard at Savannah, Ga., and the New Jersey Shipbuilding Co. awarded contracts for a $1,000,000 plant at Gloucester City, N. J. Various other shipbuilding inquiries were issued during June which remain pending. Some of the companies which have been given government ship contracts are expected to enter the market shortly. Puget Sound shipbuilders to the close of June awarded contracts for 115 steel and wooden vessels of a value of $120,000,000, of which $80,000,000 worth was held by Seattle yards.

Airplane Builders Appear as Buyers

The government's proposed aeroplane program caused some reorganization in the airplane industry, the Curtiss Aeroplane & Motor Corp. joining forces with the Willys-Overland Co., Toledo, O. The Willys plant at Elmira, N. Y., is being equipped for the manufacture of aeroplane motor parts and similar work will also be done in the Toledo plant. The Duesenberg Motors Corp., Edgewater, N. J., which is building aeroplane engines, inquired for a number of machine tools for a plant at Elizabeth, N. J. If the government's aeroplane plans are carried out demand for tools for aeroplane purposes undoubtedly will be greatly stimulated. The General Electric Co. closed for about $500,000 worth of machine tools for its Schenectady plant, during June.

Steel Mills Purchase Lavishly

Steel works additions and extensions in the Pittsburgh district called for a large number of electric cranes and some plate mill equipment. The Youngstown Sheet & Tube Co., Youngstown, O., inquired for five cranes and placed contracts for one 84-inch and one 96-inch 3-high electrically-driven plate mills. The Brier Hill Steel Co. entered the market for 10 cranes and ordered a 110-inch plate mill and auxiliary equipment. The United Engineering & Foundry Co., Pittsburgh, awarded contracts for 10 electric traveling cranes; the Mesta Machine Co., Pittsburgh, closed for two 50-ton cranes. The Carnegie Steel Co. closed for two cranes. The Crucible Steel Co. of America, Pittsburgh, is adding four stationary open-hearth furnaces and one electric furnace to its Park Works. In the east, the Midvale Steel & Ordnance Co. closed for three 20-ton cranes for its Nicetown, Pa., plant and a 120-ton ladle for its Coatesville, Pa., plant.

Prices of all classes of tools continued to advance during the month, regardless of the nature of the demand, owing to the increased costs of material. Turret lathes and other machines which can be shipped by some builders from stock were advanced 10 per cent by various leading builders. Manufacturers of radial drills announced advances of 15 per cent; sensitive drills, 10 per cent; grinders, 5 per cent; large lathes, 12½ to 15 per cent; planers, 10 per cent.

Men of Machinery Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

SAMUEL L. NICHOLSON, who has been sales manager of the Westinghouse Electric & Mfg. Co. since 1909, has been promoted to the position of assistant to vice president, with headquarters at East Pittsburgh. Mr. Nicholson received his education in the William Penn Charter School of that city, and began his business career as apprentice with the

SAMUEL L. NICHOLSON

Belmont Iron Works in 1887. He shortly became associated with the Novelty Electric Works, Philadelphia, and a few months later accepted a position with the Chadbourne-Hazelton Co., Philadelphia. This company organized the Equitable Electric Railway Construction Co., and Mr. Nicholson was sent to Reading, Pa., as assistant superintendent of construction to build the Neversink Mountain railway.

In 1896, he joined the forces of the Cutter Electric & Mfg. Co., and successfully exploited for them a new circuit-breaker, doing considerable special work in the field, making tests before railway officials, underwriter boards, and similar bodies. A year later, he went with the C. & C. Electric Co. as sales representative in New York City, where he introduced their engine-type generators and stationary motors.

In 1898, Mr. Nicholson became sales representative of the Westinghouse Electric & Mfg. Co., in New York City, subsequently having charge of the city and industrial division of the New York office. On the reorganization of the sales department in 1904, he was made manager of the industrial department, which position he held until his selection as sales manager of the company in 1909.

J. P. Henry, formerly with the National Cash Register Co., Dayton, O., has been appointed factory manager of the new plant of the Canada Cycle & Motor Co., Weston, Ont.

H. L. Paulus, R. G. Ferguson and F. L. Graf, for a number of years connected with the Baird Machinery Co., Pittsburgh, have severed their connection with that concern and have become associated with the J. S. Miller Machinery Co., Pittsburgh.

Thomas T. Cloward, for six years in charge of the Wilmington, Del., shops of the Pennsylvania railroad, has gone to St. Louis to take charge of offices for the employment of mechanics and laborers needed on the lines east of Pittsburgh.

Amos Whitney, founder of the Pratt & Whitney Co., Hartford, Conn., was tendered a complimentary dinner by 40 members of the "Old Guards" at the Farmington, Conn., Country club, June 20, in celebration of his eighty-fifth birthday.

David L. Gallup, professor of the department of gas engineering at the Worcester, Mass., Polytechnic Institute, left for Indianapolis July 1, to establish a research and consulting department for the Nordyke & Marmon Co., builders of the Marmon motor car. Mr. Gallup will temporarily take the place of Howard Marmon, who is going to France as an aircraft engineer of the aeroplane division of the United States army.

E. J. Parker, New York manager of the Morgan Engineering Co., is giving his services as sales manager of its machinery and tool department to the Vulcan Steel Products Co., New York. The Vulcan company plans to open a chain of offices in Europe, Japan, China and other countries, and Mr. Parker expects to leave New York shortly personally to conduct this work abroad.

Mr. Parker has had a broad experience in the machinery field, having been connected with the Morgan Engineering Co. for the past 23 years. He started in the drafting room of this company and spent about 10 years in this department. In 1907 he was made manager of the Morgan com-

E. J. PARKER

pany's New York office. During the past few years he has been instrumental in closing some of the largest mill propositions ever put through in this country. Two years ago he made his initial trip to Russia and brought back more than $1,000,000 worth of orders received over a period of two weeks.

Andrew H. Marshall, formerly president of the Marshall Huschart Machinery Co., Chicago, an ardent woodsman and hunter, is a member of an exploring party now in the wilds of northern Canada. The party has timed its trip to reach Hudson Bay just before the close of navigation and will return on a ship sailing through Hudson Bay and down the Atlantic past Labrador. The expedition is scientific and Mr. Marshall accompanies it for the sake of adventure. The return is expected to be made in September.

THE OPEN HEARTH

Where Team Play Most is Needed

AT A TIME when all major productive enterprise is looking to Washington for the cue as how to align itself to give its best account to the country, the radically divergent views of Secretary Baker and Secretary Lane over the method of procedure is anything but inspiriting. There is a wide gulf between the ringing praise of the patriotism of the coal men in getting together and determining a reduced price to the government uttered by Secretary Lane and the sharp condemnatory words of Secretary Baker when he denounced the price arranged as extortionate and unreasonable and the method of concerted action, as wholly illegal. There is small wonder that reports from Washington state that all plans for business dealing between the government and various industries have been thrown into confusion. The condition well describes the present state of mind of business in general. The President, already pressed with many heavy problems of war preparedness and adjustments, will be called upon to settle this new clash of authority in his own official family.

It is not so much that Secretary Baker may be right and Secretary Lane wrong in their positions or vice versa; or further, that each may be partially right. The slogan of the country's war efforts is and should be team play and co-operation. The government is calling upon the business interests to give their best and unified support of its plans. Yet the most striking example of a lack of team play and of mutual understanding is displayed in the very place where harmony must originate. The President needs to see that his cabinet officers are better informed among themselves as to what each is thinking or doing.

Woman's Place in Industry Assured

WAR'S certain toll is men. England, under war conditions, has felt the pinch of a shortage of labor in her industrial enterprises. In the United States an increasing number of cases might be cited where, men no longer available, women have taken up the burden of maintaining essential production. In a recent issue of THE IRON TRADE REVIEW a glimpse was given of the situation as it exists in English munition plants, where women are doing men's work. In this country women now are performing a highly necessary task in the manufacture of gages, without which it would be impossible to conduct a war such as the United States has entered.

In a New York state plant fine gages are made for testing high-explosive shells. From the time the raw material enters this factory until it reaches the most delicate and intricate stages, men perform all the operations. The final touch, however, is left to gentler hands. Lapping, a nerve-racking and closely defined task is done exclusively by women. They have been found to be more accurate, less subject to nervousness and more consistent workers. Hour after hour their attention must be riveted to one small gage. There is an eternal sameness about every day's work. There are no new problems to be met, no deviation from the straight-line process, no belts break to relieve the monotony, a shutdown of power provides no moment's respite. It is a steady tax on physical and nervous powers that men cannot endure for protracted periods. Due to the war, women have entered the toolmaker's field, long thought to be man's exclusively. There is little doubt that they have come to stay.

A Melting Pot For Specifications

FOR a period of 15 years the American Society for Testing Materials has been alloying the conflicting views of producers and users of materials into standard specifications that have received national recognition. Organized as a branch of the International Association for Testing Materials 20 years ago, the restraint of this affiliation, for a period of five years, led to the formation of this independent society. Notwithstanding its apparent infringement upon the scope and purpose of other technical bodies that claimed for themselves the right to promulgate specifications, it flourished because of its unique membership which is composed of manufacturers and consumers, and engineers who occupy a neutral position. Into this melting pot the most exacting buyer of material did not hesitate to thrust the preparation of the specification in which he was vitally interested and the producer likewise took a chance, convinced that he would get a "square deal".

In the early days of the society iron and steel standards largely engaged its attention, but it builded better than it knew; other lines were added upon the insistent demands from other trade and technical associations until the scope of its work today includes paint, cement, concrete, nonferrous metals, ceramics, refractories, etc. Its membership, well in excess of 2000, is representative of almost every industry and in addition it can boast of the enrollment of the country's greatest engineers. Its work has been a potent factor in raising the standards of all classes of materials and it can lay claim to the credit for preparing our industries to meet the great crisis of war now confronting them. A number of years ago, when an everlasting peace was the general conviction, means for the safe transportation of explosives were

THE OPEN HEARTH

worked out in the deliberations of the society and this is only one of the many contributing factors in our war preparations that should be credited to this body.

The annual meeting held last week was notable in the record-breaking attendance in the large number of new standards submitted; in the revisions to existing specifications to meet constantly changing conditions in processes of manufacture and in the use of materials and in the keen interest manifested in the discussion of these standards to insure the adoption of provisions that are fair to both sides.

Magnetic testing, developed at the United States bureau of standards and first reported at this meeting, may be the forerunner of new methods for ascertaining the physical properties of iron and steel without destroying or defacing the object. The application of the test, either at the mill or to materials in service, is certain to have a far-reaching effect. The test is claimed to be particularly applicable to rails and other materials of considerable length, and its X-ray faculty of detecting hidden defects may be another safeguard to the rail manufacturer in his effort to furnish an absolutely dependable product.

That the members of the society heeded President Wilson's injunction regarding the continuation of meetings and convention *as usual,* was reflected by the large attendance which equalled the high record established last year. A large number of those enrolled have been called into active service. Both the newly-elected president and vice president could not personally receive the honors bestowed upon them because of their military duties, and many other engineers and manufacturers undoubtedly were unable to attend for similar reasons.

War Prohibition an Economic Need

PROPOSALS to prohibit the manufacture of distilled spirits during the war and to give discretionary power to the President to extend prohibition to beer and wine whenever he finds it essential to conserve the supply of foodstuffs, are not entirely satisfactory from a moral, physical or economic standpoint. The delegation of this authority to the chief executive of the nation is not desirable; it would be condemned severely if the country were not at war. It merely enables congress to dodge its duty.

Generally, the American people gladly would accept "bone dry" prohibition during the war as an emergency measure. It would tend to conserve our food supply which is needed not only at home but in western Europe where our sons soon will be on the battle front. Numerous sacrifices must be made by everyone in this country if we are to win the war. Country-wide prohibition would make for general efficiency.

National prohibition, J. D. A. Morrow of the Pittsburgh Coal Producers' association told the senate interstate commerce committee, would increase production of coal and go far toward relieving the present shortage. Owners of iron ore mines in the Lake Superior regions and of beehive coke ovens in the Connellsville fields, where many employes have been ingurgitating liquor ever since "war time" wages went into effect, could give the senate committee additional information about the effects of alcohol upon men producing the essentials to the manufacture of pig iron.

"Alcoholic liquor," Mr. Morrow declared, "is one of the worst enemies of the miners in western Pennsylvania. It is impossible to get men to work even when the car supply permits. Give up liquor and the production of coal in western Pennsylvania, Ohio and Illinois would be increased 25,000,000 tons a year."

Our coal and iron ore mines and industrial plants cannot be driven to capacity if the saloons are kept running full tilt. If this nation is to feed itself and ship huge quantities of foodstuffs to its allies, its first victory must be won over John Barleycorn. Apart from any moral consideration, deprivation of alcoholic beverages is justified on purely economic grounds.

Living Up to Moral Obligations

HONESTY of the steelmaker is being put to a test never before experienced. To the credit of the business it can be said it is resisting the temptation to take offered profits at the expense of its customers.

Scarcely a steel company in this country has not had opportunity to take on tonnages of material for early delivery at offered prices that seem like an Arabian Night's dream. These prices are many dollars a ton above those to be paid on contracts made months ago by regular customers. Buyers eager to obtain material, bid far above contract rates for prompt material.

Under present circumstances, when deliveries are uncertain and delays easily explained by car shortage and other factors, it would be possible to take this tonnage and delay older and cheaper orders. This may have been done, for human nature is frail. But for the most part, contracts are being respected, temptation resisted and profits foregone while Uncle Sam is given the only preference over older contracts.

But many mill owners wonder if the consumer thus protected will remember the favor after the pressure is over and conditions resume the usual condition after the war.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 58

PIG IRON

(Delivery this year.)

Bessemer valley	$57.00 to 58.00
Bessemer, Pittsburgh	57.95 to 58.95
Basic, Pittsburgh	52.95 to 54.95
Basic, eastern Pa.	50.00
Basic, Buffalo	48.00 to 50.00
Malleable, Pittsburgh	55.95 to 58.95
Malleable fdy., Chgo. ('18).	55.00
Malleable foundry, Phila.	49.00 to 51.00
Malleable foundry Buffalo	50.00 to 55.00
No. 2 foundry, Pittsburgh	55.95 to 58.95
No. 2 foundry, Cleveland	55.00 to 56.00
No. 2 foundry, Ironton	50.00 to 55.00
No. 1 foundry, Chicago	56.00
No. 2 foundry, Chicago	55.00
No. 2X foundry, Phila.	53.00 to 54.00
No. 2X foundry, N. J. tide.	53.25 to 54.25
No. 2X foundry, Buffalo	50.00 to 55.00
No. 2 plain, Philadelphia	53.00 to 54.00
No. 2 plain, N. J. tide	53.25 to 54.25
No. 2 plain, Buffalo	49.00 to 50.00
No. 2 southern, Birmingham	45.00 to 46.00
No. 2 southern, Cincinnati	47.90 to 48.90
No. 2 southern, Chicago	50.00 to 54.00
No. 2 southern, Phila. del.	49.00 to 50.00
No. 2 southern, Cleveland	49.00 to 50.00
No. 2 southern, N. Y.	48.75 to 50.25
No. 2 southern, Boston	49.50 to 50.50
No. 2 south. interior, N. E.	50.00 to 51.00
No. 2 southern, St. Louis	43.40 to 48.40
Virginia No. 2X, furnace	52.00
Virginia No. 2X, Phila.	54.75
Virginia, No. 2X, Jersey City	55.00
Virginia, No. 2X, Boston	55.25
Gray forge, eastern Pa.	49.00 to 50.00
Gray forge, Pittsburgh	52.95 to 53.95
Gray forge, Birmingham	38.00
Silveries 8 per cent, furnace	75.00 to 80.00
Silveries, 8 per cent, Chicago	78.00 to 84.00
Low phos. standard, Phila.	92.00 to 93.00
Low phos. Lebanon, furnace	85.00
Low phos., Pittsburgh	82.00 to 85.00
Charcoal, Superior, Chicago	59.50 to 62.00
Charcoal, Superior, Buffalo	60.00 to 62.00
Charcoal, Birmingham	45.00 to 50.00

COKE

(At the ovens.)

Connellsville furnace	$15.50 to 16.50
Connellsville furnace, contract	8.50 to 9.00
Connellsville foundry, contract	12.00 to 12.50
Connellsville foundry	12.00 to 12.50
Wise county furnace, contract	7.00 to 9.00
Wise county foundry, contract	8.00 to 10.00
Pocahontas furnace, contract.	7.00 to 9.00
New River foundry, contract.	10.50 to 11.00
New River furnace, contract	7.50 to 10.00

FERRO ALLOYS

Ferro manganese, prompt	$450
Ferro manganese, last half	400 to 425
Spiegeleisen, 20 per cent furnace remainder of year	85.00 to 90.00
Ferrosilicon, 50 per cent, Pitts.	250 to 260
Ferrosilicon, 50 per cent, Pitts., 1st quarter	130.00 to 150.00
Bessemer ferrosilicon, 9 per cent.	$89.00
Bessemer ferrosilicon, 10 per cent.	90.00
Bessemer ferrosilicon, 11 per cent.	92.50
Bessemer ferrosilicon, 12 per cent.	95.00
Bessemer ferrosilicon, 13 per cent.	100.00

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O., furnaces.

SEMI-FINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$100.00 to 105.00
Open hearth, Philadelphia	90.00 to 110.00
Open hearth, Youngstown	100.00 to 105.00
Bessemer, Pittsburgh	100.00 to 105.00
Bessemer, Youngstown	100.00 to 105.00
Forging, Pittsburgh	115.00 to 125.00
Forging, Philadelphia	115.00 to 125.00
Forging, Chicago	100.00

SHEET BARS

Open hearth, Pittsburgh	$105.00 to 110.00
Open hearth, Youngstown	105.00 to 110.00
Open hearth, Cleveland	110.00
Bessemer, Pittsburgh	105.00 to 110.00
Bessemer, Youngstown	105.00 to 110.00

WIRE RODS, MUCK BAR, SKELP.

Wire rods, Pittsburgh	$95.00 to 105.00
Muck bar, Pittsburgh	80.00
Grooved skelp, Pitts., nom.	4.00c to 4.50c
Sheared skelp, Pitts., nom.	4.50c to 5.00c

SHAPES, PLATES AND BARS

Structural shapes, Pitts.	4.50c to 6.00c
Structural shapes, Phila.	4.659c to 5.159c
Structural shapes, N. Y.	4.669c to 5.169c
Structural shapes, Chicago	6.19c
Tank plates, Chicago	8.00c to 9.00c
Tank plates, Pitts. (con.)	4.50c to 5.50c
Tank plates, Pittsburgh	8.00c to 10.00c
Tank plates, Philadelphia	8.159c to 10.159c
Tank plates, New York	8.169c to 10.169c
Bars, soft steel, Chicago	4.50c
Bars, soft steel, Pittsburgh	3.75c to 4.25c
Bars, soft steel, New York	4.419c to 4.919c
Bars, soft steel, Phila.	4.409c to 4.909c
Cotton ties, Pitts., June	$2.10
Bar iron, Chicago	4.50c to 5.00c
Bar iron, Philadelphia	4.409c to 4.659c
Bar iron, Cleveland	3.50c
Bar iron, New York	4.419c to 4.669c
Bar iron, Pittsburgh	5.00c
Hard steel bars, Chicago	4.25c to 4.50c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.25c to 3.75c
Angle bars, Chicago, base	3.25c
Standard bessemer rails, mill.	$38.00
Stand. open hearth rails, mill	40.00
Light rails, 25 to 45 lbs., Chic.	75.00
Light rails, 25 to 45 lbs., Pitts.	70.00 to 80.00
Relayers, standard, mill	38.00 to 40.00
Relayers, light, Chicago	60.00
Relaying rails, light, St. L.	58.00 to 60.00
Spikes, railroad, Pittsburgh	4.50c to 5.00c
Spikes, railroad, Chicago	4.25c
Track bolts, Pittsburgh	5.50c to 8.00c
Track bolts, Chicago	5.25c to 5.50c
Tie plates, Chicago	$60.00 to 65.00

WIRE PRODUCTS

(To jobbers; retailers 5 cents more.)

Wire nails, Pittsburgh	$4.00
Coated nails, Pittsburgh	4.00
Plain wire, Pittsburgh	3.95
Galvanized wire, Pittsburgh	4.65
Polished staples, Pittsburgh	4.15
Galvanized staples, Pittsburgh	4.85
Barb wire, painted, Pittsburgh	4.15
Barb wire, galvanized, Pitts.	4.85
Cut nails, Pittsburgh	4.50

CHAIN, PILING, STRIP STEEL

Chain, ⅜ in. proof coil, Pitts.	7.50c
Sheet piling, base, Pittsburgh	3.50c to 4.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 9.00c to 9.50c.

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SHEETS

(In cents per pound.)

SHEET MILL BLACK.

No. 28, open hearth, Pitts.	9.00c to 9.50c
No. 28, bessemer, Pitts.	9.00c to 9.50c
No. 28, open hearth, Chgo.	9.69c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	9.00c to 9.50c
No. 28, bessemer, Pitts.	9.00c to 9.50c

GALVANIZED

No. 28, open hearth, Pitts.	10.25c to 11.50c
No. 28, bessemer, Pitts.	10.25c to 11.50c
No. 28, open hearth, Chgo.	11.19c

BLUE ANNEALED

No. 10, open hearth, Pitts.	8.50c to 9.00c
No. 10, bessemer, Pitts.	8.50c to 9.00c
No. 10, open hearth, Chgo.	9.69c
No. 10, open hearth, Phila.	8.659c

TIN PLATE

(Per 100 lb. box.)

Tin plate, coke base, nom. 10.00c to 15.00c

IRON AND STEEL PIPE

(Prices adopted June 18, 1917.)

Steel

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
¼ to 3, butt	42	28½

Iron.

(Prices adopted June 30, 1917.)

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
¼ to 1½, butt	33	17

BOILER TUBES

(Price adopted April 2, 1917.)

Steel, 3½ to 4½ inches, l. c. l.	34
Iron, 3½ to 4½ inches, l. c. l.	28

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	68.50
Six-inch and over, Chicago	65.50
Four-inch, New York	68.50
Six-inch and over, New York	65.50
Four-inch, Birmingham	58.00
Six-in. and over, Birmingham	55.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	6.00c to 6.50c
Bands, Pittsburgh	6.00c to 6.50c
Shafting, Pittsburgh, carloads	5 off to list

RIVETS

Structural rivets, Pittsburgh.	5.25c
Boiler rivets, Pittsburgh	5.35c
Tinner's rivets, Pittsburgh	40 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter.)

Rolled thread	35
Cut thread	30 and 5
Larger or longer	20

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts.)

Rolled thread	40
Cut thread	35
Larger and longer	25
Cold pressed, semi-finished, hexagon nuts	50 and 5
Gimlet and cone point lag bolts.	40

NUTS

Hot pressed, square, blank	$1.90 off
Hot pressed, square, tapped	1.70 off
Cold pressed, square, blank	1.25 off
Cold pressed, square, tapped	1.00 off
Hot pressed, hexagon, blank	1.70 off
Hot pressed, hexagon, tapped	1.50 off
Cold pressed, hexagon, blank	1.25 off
Cold pressed, hexagon, tapped	1.00 off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products July 3, average for June, 1917, average for April, 1917, and average for July, 1916. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices July 3, 1917.	Average prices June, 1917.	April, 1917.	July, 1916.
Bessemer pig iron, Pittsburgh..	$57.95	55.20	42.20	21.95
Basic pig iron, Pittsburgh.....	52.95	50.20	39.70	18.95
No. 2 Foundry pig iron, Pitts..	55.95	51.02	39.95	19.45
No. 2 Foundry pig iron, Chgo..	55.00	51.00	39.25	19.00
Lake Superior Charcoal, Chicago	59.50	51.80	42.20	19.75
Malleable, Chicago	55.00	50.50	39.00	19.50
Southern No. 2, Birmingham...	46.00	35.75	24.50	15.00
Southern Ohio No. 2, Ironton..	54.00	38.60	33.00	18.50
Basic, eastern Pa.....	50.00	46.375	38.25	19.25
No. 2X Virginia, furnace.....	52.00	46.50	38.25	18.50
No. 2X foundry, Philadelphia..	53.50	47.50	41.50	20.00
Ferro mang., delivered.....	450.00	431.25	360.00	175.00
Bessemer billets, Pittsburgh....	100.00	93.75	72.50	40.00
Bessemer sheet bars, Pittsburgh	100.00	101.25	72.50	40.00
Open hearth sheet bars, Pitts..	105.00	101.25	72.50	40.00
Open hearth billets, Pittsburgh.	105.00	93.75	72.50	40.00
Steel bars, Pittsburgh.....	3.75	3.62	3.38	2.50
Steel bars, Chicago.....	4.50	4.55	3.54	2.35
Iron bars, Philadelphia.....	4.409	4.259	3.659	2.559
Iron bars, Cleveland, local del'y	4.25	3.50	3.00	2.40

*Seaboard.

	Prices July 3, 1917.	Average prices June, 1917.	April, 1917.	July, 1916.
Iron bars, Chicago mill.....	4.75	4.00	3.19	2.35
Beams, Chicago	6.19	4.65	3.80	2.69
Beams, Pittsburgh contract.....	4.50	4.00	3.46	2.50
Beams, Philadelphia	4.909	4.659	4.659	2.659
Tank plates, Pittsburgh.....	8.00	4.50	4.50	2.86
Tank plates, Chicago.....	10.19	7.90	4.70	3.09
Tank plates, Philadelphia.....	10.159	9.659	7.159	3.909
Sheets, blk., No. 28, Pittsburgh	9.00	8.13	5.75	2.90
Sheets, blue anld., No. 10, Pitts.	8.50	5.57	5.37	3.00
Sheets, galv., No. 28, Pittsburgh	10.25	9.95	7.56	4.37
Wire nails, Pittsburgh.....	4.00	3.62	3.20	2.50
Connellsville fur. coke, contr...	9.00	8.50	7.25	2.42
Connellsville fdy. coke, contr...	12.50	10.10	7.90	3.15
Heavy melting steel, Pittsburgh	44.00	40.00	28.10	16.25
Heavy melting steel, eastern Pa.	39.00	36.625	26.00	15.00
Heavy melting steel, Chicago...	38.00	37.00	26.60	14.15
No. 1 wrought eastern Pa.....	57.50	47.875	40.00	19.75
No. 1 wrought, Chicago.....	40.50	41.75	29.80	13.90
Rerolling rails, Chicago.....	49.50	46.00	31.90	15.70
Car wheels, Chicago.....	39.50	37.00	23.25	12.25

(For Additional Prices See Page 58)

Sell Iron for Last Half of 1918

Chicago Melter Buys 5000 Tons at $52—Bessemer and Basic June Averages Break Record With Rises of $7.29 and $7.25 Respectively—Market More Rational But Some Advances Still Appear

Chicago, July 2.—A consumer in the Chicago district has placed an order for 5000 tons of No. 2 foundry iron for the last half of 1918 at $52, Chicago. This is the first sale for last half of 1918 delivery to be made, although several inquiries have been received for that period. Sales of northern iron for the last half of this year and the first half of 1918 have practically ceased. Occasional sales of small tonnages are being made. Demands continue strong. A quotation of $55, Chicago, remains firm. Demands for Lake Superior charcoal iron have quieted down and the price remains firm at $59.50 to $62, Chicago. Quotations on southern iron have increased slightly and prices for last half of this year now range from $46 to $50, Birmingham. Quotations for southern iron for first half of 1918 vary from $44 to $48. Southern makers still are able to supply small tonnage for immediate delivery and report a fair amount of unsold tonnage for first half of next year. Carload lots are placed frequently, including one spot sale at $50, Birmingham.

Local furnaces have almost no iron for contract until July 1, 1918, and are sold practically full for 12 months.

Sales Small But Numerous

New York, July 2.—While comparatively few blocks of pig iron in excess of 1000 tons have been closed in this district this week, small tonnage buying has been of increasing proportions so that the volume of bookings shows no shrinkage. It is estimated that inquiries for foundry iron involving from a carload to 500 tons each now aggregate fully 10,000 tons. The General Electric Co.'s inquiry for 10,000 to 15,000 tons for last quarter and first half shipment remains open. New inquiries for basic have come out in the east and the total involved in pending inquiries including the first half requirements of a Buffalo district consumer, aggregates fully 15,000 tons. It now is reported that the C. Pardee Works, Perth Amboy, N. J., recently placed 5000 tons of low phosphorus basic with a valley maker at $50, valley, for first half.

Prices continue their sharply defined upward movement and with all nearby makers the minimum on No. 2X now is $53, furnace, for this year, and $52 for first half. The new level was established following a large sized business at around $52 for this year and $50 and $51 for next. The new level already has been done by eastern Pennsylvania furnaces on a good sized tonnage in the aggregate and to a lesser extent by Buffalo furnaces. Very little Buffalo iron under present conditions is offered in this district due to the sold-up condition of the makers. Following the sale early this week of a large tonnage of bessemer iron by an eastern maker at $60, furnace, for delivery over an extended period, another lot of several thousand tons has been sold to an eastern consumer.

Export inquiries now under active negotiation include approximately 5000 tons of basic and 5000 tons of foundry for early shipment to Japan and several thousand tons of bessemer for Italy. Considerable iron for Japan has been closed during the past few days, including one lot of 5000 tons of Alabama No. 2, which went at $44.50.

East Buying Steelmaking Iron

Philadelphia, July 2.—Pig iron again has been fairly active during the past

week. The principal sale in this district involved more than 10,000 tons of standard low phosphorus for first half on the basis of $92 to $93, Philadelphia. Several thousand tons of Lebanon low phosphorus for this and next year oven sold at $87 and lower. Several thousand tons of bessemer were sold at $56 to $60, eastern furnaces. Three good-sized basic inquiries have been put out, but none has been closed and two now have been withdrawn. The Bethlehem Steel Co. wants 5000 to 6000 tons of special analysis basic and malleable. A round tonnage of malleable for this year was closed at $58.50, delivered this district. Foundry iron is active. Sales have comprised a large number of small and numerous 1000-ton and larger lots. The minimum on eastern Pennsylvania No. 2X is $53, furnace, for this year, and $50 for next. Some makers are quoting $3 and $4 higher. The minimum on Virginia No. 2X for this year is $52.50, furnace.

Little Iron For This Year

Buffalo, July 3.—The range in pig iron prices in this district is from $50 to $55 with an aggregate of inquiry of between 30,000 and 40,000 tons. The prices quoted are for the first quarter and first half of 1918 since there is practically nothing available for this year. Producers say the 1917 market is sold up with the exception of a negligible amount. That amount has been placed as low as 700 tons. On a number of cases producers will not quote on the pending inquiry because of their heavily sold position.

Average Price Record Broken

Pittsburgh, July 2.—Quotations on pig iron continue their spectacular advance toward the $60 mark. According to compilations based upon actual sales, bessemer and basic advanced more sharply in June than in May, when each grade shattered all previous records, by moving upward $4.60 and $3.90, respectively. W. P. Snyder & Co., whose compilations are based upon actual sales of 1000 tons or more by valley furnaces, report that the average price of bessemer and basic last month was $53.266 and $49.149, valley, respectively. These represent advances during the month of $7.27 in bessemer and $7.25 in basic. Numerous sales were made last week at several dollars a ton above those figures, although they did not enter into the computations because they involved less than 1000 tons. Compared with averages established in the corresponding period of 1916, bessemer last month had advanced $32.26, and basic, $31.149 a ton. In June of 1916, bessemer sold at $21 and basic at $18, valley; the latter grade has just about trebled its price. Although demand is described as heavy, no large tonnages have been sold recently in the open market. The General Electric Co., Schenectady, N. Y., has been negotiating for 6000 tons of basic and the Erie Forge Co., Erie, Pa., credited with having taken 5000 tons of basic last week, is figuring on an additional block. All sellers of foundry irons have advanced prices to $55, valley, as a minimum; sales of foundry at as high as $58, valley, are reported.

Buyers Are Furnishing Iron

Cleveland, July 3.—An increasing number of cases is being shown where buyers are being obliged to furnish iron to casting makers in order to get essential supplies. One steelmaker directed to an ingot mold manufacturer some tonnage of basic which he originally had purchased for his own needs. Otherwise, the steel plant could not have continued full operations. The General Electric Co. has been seeking 6000 tons of basic for a Pittsburgh district foundry which is making castings for it. Another buyer wants 10,000 tons of additional basic for this year and next, but is having much trouble to get the iron, especially for this year, as this grade is exceedingly scarce. The usual quotation on basic, malleable and foundry now is $55, furnace, for first half. General inquiry still is good but supplies are small. A sale of low silicon foundry was made at $56, furnace, and $58, western Pennsylvania furnace, was paid on a small lot of No. 2 for first half. Sales of Virginia No. 2X for this year were closed here at $52, furnace, or $55.20, delivered. On 10 per cent bessemer ferrosilicon $100, southern Ohio furnace, was named. Silveries are quoted sparingly.

Iron Makers Prepare to Aid Government

New York, July 3.—A number of pig iron manufacturers from various sections of the United States met June 29 in New York City to discuss ways and means of serving the government to the limit of their ability wherever pig iron might be required for use in any of its departments in the present crisis.

No definite plan was decided upon and there was only a general discussion of methods that might be followed to the best advantage. However, a committee, consisting of representative pig iron manufacturers in different sections of the United States, was appointed, with C. D. Dyer of the Shenango Furnace Co., Pittsburgh, as chairman. This committee will give the matter further consideration in the near future after having conferred, if possible, with government officials at Washington.

Virginia Iron Snuffed Up

Cincinnati, July 2.—Offers of Virginia No. 2X at $50, furnace, for first half shipment made last week by a furnace interest, brought out a number of inquiries and orders. The tonnage offered this producer by different sales agencies was so great that all prices were withdrawn after only a few lots were accepted. The Standard Sanitary Mfg. Co. bought 2000 tons of Virginia iron for first half, and about the same tonnage of northern foundry. The same buyer also purchased two lots of southern foundry. It is reported that the United States Sanitary Mfg. Co. also purchased 1000 tons of northern foundry iron for first half. Southern prices are being steadily advanced, and for spot shipment some No. 2 foundry has brought $50, Birmingham. This same quotation is being made by two or three furnaces for first half, although no contracts have been made at that figure. The minimum quotation for first half now is $45, but $46 has been done for that delivery. Basic iron in all districts is harder to get for this year, and it would be difficult to say what price could be obtained. In the Ironton district $55, furnace, has been established both for the last half of this year and for the first half of next year. Widely divergent quotations are made on the Ohio silvery irons, and for first half from $75 to $85 is quoted for 8 per cent. The open inquiry for all kinds of iron is limited, although there is a large total tonnage under quiet negotiation.

May Have to Cut Operations

St. Louis, July 2.—Pig iron prices moved still higher in this market during the past week. New high records were made, and under stress of scant supplies and a broad and urgent demand, exorbitant prices have failed utterly to check purchasing. Dealers declare they could dispose easily of large tonnages at maximum figures were the iron available. Inquiries aggregating 18,000 tons were received by various dealers and producers here during the week. A considerable part of this is for delivery over the first half of 1918, for which $53.40, St. Louis for No. 2 southern is quoted. No sales for prompt shipment or this

year were reported. One local melter bid $55 for a small lot of iron which is the highest so far known here. Barring some unlooked for favorable development in the situation, several of the most important melters in this district face the necessity of greatly curtailing their programs. There has been heavy substituting of scrap. Scrap supplies, however, also have been scarce. All steelmaking irons are scarce, and even the most optimistic observers in the market can see no relief for many weeks to come.

Southern Supply Grows Scarce

Birmingham, Ala., July 3.—Southern pig iron continues to grow scarcer as well as higher. Quotations for No. 2 foundry for delivery during the first half went to $46 per ton the past week, while spot or this year's delivery, and special brand and analysis irons were sold as high as $50 per ton. The pig iron manufacturers in the south are waiting patiently as to the move of the government. Various contracts for the government undergoing execution in the Birmingham district, include cast iron shells, lathes, steel billets, wire, steel plates and structural steel for navy yards. Make of iron in the Birmingham district is being kept up well. One of the Woodward Iron Co.'s furnaces at Vanderbilt is undergoing repairing; the Shelby Iron Co. will blow in the No. 2 furnace at Shelby this week, using coke. The furnace at Trussville may not go in before September or October. Local consumers of iron are being accommodated in delivery through the use of flat cars and by motor trucks and drays in the immediate district. Cast iron pipe plants, foundries and other consumers are meeting demands up to a couple of hundred tons a day in this way.

Shell Tonnages

Distributed by Government—Coke Reported at $17, Ovens

Pittsburgh, July 3. (By wire.)—The has distributed orders for huge tonnages of bars for the manufacture of shells. The Republic Iron & Steel Co. has been called upon for 5500 tons of bars, the initial distribution.

Connellsville coke is selling at a wider range. Some fuel is reported to have commanded as high as $17, ovens, for spot shipment.

Revised cards on wrought iron pipe, showing advances ranging from 5 to 7 points, quote ⅛ to ⅜-inch butt-welded galvanized pipe at list plus 3 to 4 points.

The Colonial Iron Co., on June 21, shifted its blast furnace at Riddlesburg, Pa., on low phosphorus and bessemer iron.

Bar Products Go Higher

Bar Iron Higher in East and Chicago—Hoops and Bands Up—Rivet Advances Now General

Chicago, June 30.—Makers of hard bars refuse to sell except to supply needs of the government. Prices on this commodity for current delivery range from 4.25c to 4.50c, Chicago, although so few sales have been made that it is almost impossible to quote an average figure. Makers have no disposition to sell, due to the rail situation and some have closed their books for 1917 business.

Soft Steel Bars Are Inactive

Chicago, June 30.—Inquiries continue strong for soft steel bars, but the market remains stagnant due to the refusal of makers to sell. One small lot was sold last week at 4.69c and was furnished by an eastern independent mill.

Munition Bars are Distributed

Pittsburgh, July 2.—Several mills in this and the Youngstown districts are reported to have received rather large orders for rounds for the manufacture of shells, but details of these orders have not been announced. Several plants, equipped some time ago to fill orders for munitions for the allies, have been active buyers of additional machinery since the United States entered the war; this leads to the belief that the government has been a more active factor in the market for munitions than generally surmised. Steel bars are selling at 3.75c and above. Manufacturers of bar iron in western Pennsylvania have advanced quotations $5, to 5c.

Rivet Trade is Active

Pittsburgh, July 2.—It is reported that huge tonnages of rivets have been distributed among manufacturers for delivery to the navy and shipbuilding yards. The entire capacity of rivet machines likely will be devoted to the manufacture of ship rivets before the end of the year. Early advances in quotations on nuts, bolts and rivets appear to be imminent. Although no changes have been made in published discounts, they are regarded as nominal, since scarcely any material is being sold in the open market.

Concrete Bars Show Range

Cleveland, July 3. — Considerable range is shown in reinforcing bar prices. One producer named 4.25c, mill, on some business in northern Ohio, and on the other hand, it is reported that less than 4c was done by another mill. A large independent has made sales of soft steel bars at 4.50c, Pittsburgh, or 4.605c, Cleveland, for delivery in four to eight weeks. Cleveland rivet manufacturers now have put up their prices and have adopted the 5.25c and 5.35c, Pittsburgh, quotations for structural and boiler rivets recently announced for the Pittsburgh district.

Will Not Allot Rivets

Plans to allot the government's rivet requirements among the different manufacturers are understood to have been dropped. The government will secure individual offers from the manufacturers or will rely upon the consumers securing their supplies. The shipbuilders, for instance, will secure their rivets from their usual sources.

Eastern Bar Iron Higher

Philadelphia, July 2.—One eastern maker has advanced iron bar to 4.75c, Pittsburgh, or 4.909c, Philadelphia. Other makers last week took business at 4.25c to 4.50c, Pittsburgh. Boat and railroad spikes are quoted at 6.50c, Pittsburgh. All bolts and rivet prices have been advanced.

Will Not Sell Bar Iron

Chicago, June 30.—Bar iron is quoted at 4.50c to 5c for third quarter delivery, but few sales have been made. A few odd carloads are available for third quarter. A sale of a small lot was made last week at 4.50c but this is practically the only transaction recorded. Agricultural implement manufacturers have inquired for material for first half, 1918, but no bids or estimates have been made. The uncertainty of war requirements precludes any transactions for 1918 at this time.

Hoops and Bands Higher

Pittsburgh, July 2.—Proposed legislation prohibiting the manufacture of distilled spirits during the war will not affect the market for steel hoops appreciably, according to manufacturers in this district. General demand exceeds supply by a broad margin. Hoops and bands are selling at as high as 6.50c, $5 a ton above the previously prevailing maximum price. Scarcely any tonnage is available for shipment before the latter part of this year.

More Ship Steel Placed

20,000 Tons for Government Boats Distributed—Pittsburgh Shipping 75,000 Tons Monthly—Specifications Deluge Eastern Mills

Pittsburgh, July 2.—Mills rolling plates suitable for shipbuilding purposes are being called upon for constantly increasing tonnages. Approximately 20,000 tons of steel are to be furnished by the Carnegie Steel Co. for the construction of 20 composite vessels for the government to be built by the Terry Shipbuilding Co. at Moss Point, Miss. This tonnage was distributed through the committee of the American Iron and Steel institute. It conservatively is estimated that mills in the immediate district are shipping no less than 75,000 tons of plates each month to the navy and to private shipbuilding concerns along the seaboards and the Great Lakes. Several plants now devoting approximately 10 per cent of their capacity to this work likely will be called upon to double or treble shipments before the end of the year. However, leaders of the iron trade say the resources of the industry are so great that domestic interests should not be affected. Proposals to curtail the output of steel entering into the manufacture of pleasure automobiles, steel furniture and other products using steel are regarded as neither sound nor judicious. While it is apparent that production cannot be increased appreciably, on account of the unsatisfactory labor and traffic situation, yet people in close touch with the situation say there is no reason why domestic activity should cease. Steel plates are selling at 8c to 10c and above. No formal prices exist for delivery at the convenience of the mill; manufacturers in a position to sell for any delivery are establishing market prices.

Rush Forward Specifications

Philadelphia, July 2.—Plate mills in this district last week literally were swamped by specifications of tonnage on contracts expiring June 30, buyers straining a point not to lose a pound of unspecified material on contract placed months ago at lower prices than the present basis. This morning the mills in some cases sent out letters canceling all unspecified tonnage on such contracts in order to forestall consumers who failed to call for all of their undelivered tonnage before the close of business last Saturday. New demand for plates continues heavy and there is much eagerness for contracts, but the mills continue to reserve their tonnage for regular customers. In no cases are contracts being accepted for specification beyond third quarter. Inquiries for export continue to come out and Japan, Italy, Spain, Norway and other countries are in the market for lots of 2000 to 5000 tons. A noteworthy feature is that American shipyards for some time past have not placed much business with the mills; this is due to the fact that practically all the shipyards are busy filling the requirements of the government. Minimum for tank plates still is 10c, Pittsburgh, or 10.159c, Philadelphia, although some orders have been placed at 10.50c and higher, depending on the specification and delivery. It is difficult to get any promise of delivery earlier than 12 months. The scarcity of plates, and fears that the supply will be severely restricted by government purchases, have created much uneasiness among consumers.

Want Steel for Helmets

Cleveland, July 3.—An inquiry for 250 tons of light plates for helmets has appeared in this territory. The specifications call for material similar to armor plate steel. Certain plate mills, which have been able to furnish comparatively early shipment, now are withdrawing from the market because of allotments of government tonnage just placed or indicated. A mill in the Pittsburgh district received 6000 tons and an eastern Pennsylvania maker who has been selling in a considerable degree in this district will get 5000 tons. Another eastern mill this week quoted 10.50c, mill, for tank plates for delivery in the second quarter of next year. A third eastern producer is quoting 10c, mill, for delivery at convenience. Local platemakers are experiencing trouble both in getting in material and in shipping out product because of insufficient transportation. Output is suffering accordingly.

Mills Refuse Orders

Chicago, July 2.—Lack of plates for sale in the open market has served to maintain current prices in spite of a strong demand. Mills are reserving their capacities for the production of materials for the shipbuilding program and have nothing to offer except to the government. The 10c quotation still prevails.

Sheet War Orders Many

Mixed Needs Before Valley Mills About 12,000 Tons—More Eastern Orders Placed—Cuts to 20 Per Cent

Youngstown, July 3.—Inquiries for all grades and sizes of bessemer and open-hearth sheets from fabricators working on government orders for war materials are increasing in the valley. None of these tonnages are particularly large but the aggregate is probably 12,000 tons, mostly for camp and cantonment construction and equipment. Over 10 per cent of the capacity of valley mills is engaged with military work. Most of the remaining capacity is taking care of old customers as far as possible. New commercial consumers have little chance. Little business for forward deliveries is being taken in view of the increasing demand both from the government and from contractors doing government work. No. 28 bessemer black sheets are quoted at 9c, Pittsburgh; No. 28 galvanized up to 11c, Pittsburgh, No. 10 blue annealed at 8.50c, Pittsburgh. Prices being made to the government are up to 20 per cent less than these quotations.

More Government Tonnage Placed

Philadelphia, July 2.—Additional government sheet requirements have been distributed during the past week. Some of these specifications were very large and were accepted by the mills upon the buyers exhibiting the contracts with the government. There is a very heavy new demand for sheets in this territory including thousands of tons for export. Eastern mills are not quoting on the latter. No. 10 blue annealed now is quoted by eastern makers at from 8.50c to 8.75c, Pittsburgh, or 8.659c to 8.909c, Philadelphia.

No Complaint from Trade

Pittsburgh, July 2.—Realizing that what surplus tonnage ordinarily finds its way to the open market is being absorbed by the government, consumers readily are paying premium prices for steel sheets for shipment in fall. Just at present, the nation is taking no large tonnages from any single mill and it is not believed that the sheet committee will call upon mill managers for more than 10 per cent of their output this year. Eventually, 25 to 40 per cent of the sheet mill capacity may be devoted to the manufacture of munitions. Quotations show no important change in position. Black sheets are selling at 9c; galvanized, 10c, and blue annealed, 8.50c and above.

Shape Prices Keep Up Rise

Eastern Mill Takes Third Quarter Tonnage at 6c—Steel Requirements Being Cut in Jobs—Government Active

New York, July 3.—Prices on plain structural shapes continue to advance. A leading eastern mill, which previously has been quoting 4.35c, Pittsburgh, minimum, for shipment at convenience, has advanced to 4.50c, Pittsburgh, or 4.669c, New York. This now is the lowest price here and the maker quoting it is booked ahead about 10 months. On preferred shipment this mill quotes 4.75c to 5c, Pittsburgh, and numerous small tonnages, have been sold at 4.75c to 5c this week. Another eastern mill which is sold up for the greater portion of a year has a nominal minimum of 4.75c, Pittsburgh. Another large maker continues to take on tonnage at 6c, Pittsburgh, for third quarter specification. Demand for structural shapes now is in connection mainly with extensions to navy yards and arsenals, munition manufacturing plants and with other uses originating chiefly in the country's war requirements. The list of commercial projects in the metropolitan district is very slender and still requirements in pending jobs are being cut to a minimum. No awards yet have been made on the small buildings involving a total of 4500 tons, on which the navy department recently opened bids. Numerous export inquiries for plain shapes continue to come out but the mills as a rule are not quoting. Another lot of several thousand tons of ship shapes has been sold for export at 8c, Pittsburgh.

Seek Plain Material Tonnages

Philadelphia, July 2.—Inquiry for plain structural shapes in this district during the week, in addition to several lots of a few hundred tons each for export, included 5000 tons for a jobber and 3000 tons for a fabricator who wants this material for car construction. None of these orders, so far as known, were placed, and in most cases the mills did not quote. The mills generally continue to restrict new business as much as possible. One maker continues to take contracts from regular customers at 6c, Pittsburgh, for specification over the third quarter. Another has a minimum of 4.50c, Pittsburgh, on shipment at convenience, and is doing 4.75c and 5c on small lots for preferred shipment. The navy department is taking bids on a tonnage for additions to Isherwood and Bancroft halls at Annapolis.

Ship Work Takes Output

Chicago, July 2.—Structurals for ships constitute almost entirely the new business with Chicago mills. Fabricators are seeking no additional contracts and the market is at a standstill with quotations of 6.19c prevailing. Makers of agricultural implements have indicated a desire to place business for the first half of 1918 but the attention of makers and fabricators is focused on the needs of the government and there is little opportunity to place any business except that intimately related to army and navy programs.

No Let-Up for Fabricators

Pittsburgh, July 2.—Fabricators are inclined to believe that men directing the affairs of the government during its emergency have underestimated the capacity of the rolling mill industry, claiming that interests of domestic consumers need not be jeopardized to prosecute the war vigorously. While it is admitted that prevailing high quotations have discouraged domestic consumers, yet it is pointed out that many domestic structural projects likely would be undertaken, if it were not for the war. Fabricating shops in the Greater Pittsburgh district are being operated at capacity on contracts taken some time ago and on direct and indirect government work. Structural shapes are selling at 4.50c and above, or about $10 above the nominal minimum price prevailing a week ago.

CONTRACTS PLACED.

Bridges and buildings for Pennsylvania railroad, 2000 tons, distributed to L. F. Shoemaker & Co., Fort Pitt Bridge Works, Bethlehem Steel Bridge Corp. and Phoenix Bridge Company.

Bridge for Philadelphia & Reading railroad, 170 tons, to Phoenix Bridge Co.

CONTRACTS PENDING.

Alterations to Musical Mutual Protective Union building, 210 East Eighty-sixth street, New York, 400 tons, bids being taken.

Boiler house for Consolidated Gas, Electric Light & Power Co., Baltimore, 400 tons, bids being taken.

Munition Tonnages Closed

But Particulars Are Not Announced—Large Quantities Are Involved—Odd Lots of Semifinished Steel High

Pittsburgh, July 2.—Manufacturers of semifinished steel in western Pennsylvania are known to have taken huge contracts for the manufacture of munitions, but it is as difficult to learn particulars of these transactions as it would be to find the proverbial needle in a haystack. One manufacturing interest advises that it is devoting considerably more than 10 per cent of its entire capacity to direct or indirect requirements of the government, and it appears likely that all mills eventually will be called upon to direct from 10 to 20 per cent of their productive capacity to the prosecution of the war. Billets have commanded more than $100, Pittsburgh, for nearby shipment. Wire rods have brought $105, mill.

Strip Steel Up to 9.50c.

Pittsburgh, July 2.—Several mills now are quoting strip steel at 9.50c, $10 a ton above the prevailing minimum price. Deliveries show no improvement and attractive premiums are being paid to mills in a position to ship before autumn.

Semi-Finished Selling High

Cleveland, July 3.—An accumulation of odds and ends of rerolling open-hearth slabs and billets was sold in this district this week at $105, mill. Four or five carloads of forging billets were sold at about $130, mill. Nothing has transpired in sheet bars in this territory. It develops that 5000 to 6000 tons of special forging steel, which has been pending for a local plant, has not been actually placed as the contract for the army and navy guns for which this material is wanted has not been formally placed. The buyer, however, is expecting the government to designate the mill which will supply the steel. There are various inquiries in the market for steel for bayonets, knives, etc. Relatively heavy lots of electric steel recently have been placed. Makers who recently were in shape to give prompt delivery now are promising nothing under four months.

Rods Sell for Export

New York, July 2.—Sales of 2000 tons of bessemer iron rods have been made at from $93 to $94, New York. These transactions are for export delivery.

Offer Mill Cinder

Philadelphia, July 2.—Mill cinder for delivery over the last half of 1918 is beginning to be offered by eastern producers. Large sales are expected to be consummated shortly. Rolled scale is not being offered as yet on an important scale. Higher prices for this material compared with the first half of the year are anticipated.

Coke Breaks All Records

Spot Furnace Goes to $16.50—Foundry Contract at $14—Year's Advance is Over 700 Per Cent

Pittsburgh, July 2.—Blast furnace coke for spot delivery was sold today at $16.50, ovens, the highest price recorded in the memory of some of the older cokemakers in western Pennsylvania. The lowest price reported today was $15.50, ovens. On account of the holiday this week, many blast furnace managers are buying all the available coke they can locate; they appear to be willing to pay almost any price, if car numbers can be furnished. The Wisconsin Steel Co. last week was an active factor in the market. A year ago, spot coke was offered at $2.35 and two years ago, at $1.55 a ton. It is not unlikely that consumers will pay as high as $18 or $20 a ton this week. Several cokemakers say the observance of the national holiday already has affected operations. As previously pointed out, no fuel is being offered for future delivery. No great demand is reported for foundry fuel and quotations are unchanged. Production of coke the week ending June 23, was 361,661 tons, compared with 354,459 tons the week before, according to *The Connellsville Courier*.

Spot Furnace Brings $16

Philadelphia, July 2.—A large tonnage of spot furnace coke was sold in this territory this week at $16 eastern Connellsville oven. Practically no foundry coke now is being offered.

Foundry Contract at $14

Cleveland, July 3.—A several month contract in standard foundry coke has been closed in this territory at $14, Connellsville ovens. Spot coke is exceedingly scarce.

By-Product Sold at $15

Chicago, July 2.—Demands for coke continue unabated in the Chicago district and further price advances are expected. Negotiations have been completed for 5000 tons of by-product coke at $15, furnace. Labor shortage and interrupted shipments are seriously handicapping the productions of by-product coke in this district. This situation is reflected on the production of pig iron resulting in a lessening of output.

Spot Coke Still Climbs

Cincinnati, July 2.—The labor shortage in the Connellsville field has caused another advance in foundry coke, and this was sold for spot shipment last week as high as $15 per ton at oven. Some prompt foundry coke changed hands around $13.50, so that the range in spot prices now is from $13.50 to $15. Contract figures are undisturbed around $10 to $12 for foundry coke and from $9 to $10 for furnace coke. Spot furnace coke is held at from $13 to $14.50, but very little 48-hour coke is being bought for either prompt or future shipment. New River prices on foundry coke coincide with those quoted in the Connellsville field, but Wise county and Pocahontas oven operators are asking about $1 a ton less for spot shipment coke.

Ask $17.95 for Coke

St. Louis, July 3.—Brokers here are asking $17.95 for 72-hour Connellsville and Virginia foundry coke, a new high record. There is no abatement in the demand, which is generally described as urgent. Curtailment of operations by certain prominent melters, due to the pig iron shortage, has released some coke, but supplies are decidedly stringent. Certain dealers ascribe the immediate high quotation to the loss of production which usually accompanies the celebration of the July 4 holiday. Efforts of the government to improve deliveries and settlement of labor difficulties are expected to bring relief.

Southern Coke Sells at $15.50

Birmingham, Ala., July 3.—A small lot of foundry coke for immediate delivery, was sold in the Birmingham district at $15.50 per ton recently, but that is above the market. Delivery is being made on considerable coke sold at $12.50 while much of the product is going out at $10 and even below that figure. Furnace coke also is in sharp demand with prices above $6 per ton. Makers are selling little since contracts in hand require practically every ton that can be produced. A few car lots of coke are reported dealt in from time to time and the quotations range between $12.50 to $15. There is some apprehension in the coal and coke circles in this state by reason of the organization work among the mine workers. The United Mine Workers of America organizers are working over time and are announcing they will ask for recognition from the operators before long.

Little Snap to Ferro

Sales Are Few and Prices Lack Uniformity—Spiegel Tonnage Placed for First Half of Next Year

New York, July 2.—Very little activity has been shown by the ferromanganese market during the past week. Practically the only business reported involved a moderate tonnage of domestic metal at $375, delivered, for first half. The market on prompt continues at $450 to $460, and on last half $425 to $450. No further offerings of English ferromanganese have been made.

Although sales of several thousand tons of spiegeleisen were made to Chicago and Pittsburgh district consumers during the past week at around $85, furnace, for last half, and $75 for first half, business in the east was quiet. A few hundred tons, all for last half, were sold at $85 to eastern consumers.

Fifty per cent ferrosilicon is less active. Although prices for prompt have shown an advancing tendency, prompt having reached $275 and $300, delivered, future quotations are easier. Plenty of this metal may be had for the last half at $225. A new producer during the week offered first half metal at $200. This figure, however, is in advance of the market, as sales recently have been made at $130 and this price continues available.

Ferroalloys Irregular

Pittsburgh, July 2.—No two dealers at Pittsburgh are quoting 80 per cent ferromanganese at the same price, but this is not surprising, in view of the fact that scarcely any tonnage is available for shipment this year. One merchant, after selling freely at $425, delivered, advanced his minimum to $450 for this year, but several other sellers say they are unable to find buyers at $400, delivered. Lower grades of bessemer ferrosilicon are being sold at prevailing quotations and further advances in price appear to be imminent. Spiegeleisen is held at $85, Pittsburgh.

Spiegel Sold For First Half

Chicago, July 2.—A number of small lots of 20 per cent spiegeleisen have been sold for first half of 1918. Prices are quoted at $87 to $87.50, eastern furnace, for last half. Quotations for first half of 1918 have been established at $81 to $85, eastern furnace, with freight rates from $3.50 to $5 to Chicago.

Pig Iron Output Shows Slight Gain

Blast Furnaces in June Produced Pig Iron at Second Highest Rate in History—First-Half Output Falls Behind—Number of Active Stacks Sets Record

PIG IRON production in June was with one exception, the heaviest ever recorded in any month. The blast furnaces last month showed an average daily production of 111,083 tons, which has been surpassed only in October, 1916, when the record of 113,167 tons was made. Due to the shorter month, the actual output of coke and anthracite pig iron fell off slightly in June. Last month's total of 3,332,509 tons compares with 3,413,677 tons in May, a loss of 81,168 tons.

AVERAGE DAILY PRODUCTION.

	1917.	1916.	1915.	1914.	1913.
Jan.	101,930	102,319	51,323	60,624	89,929
Feb.	94,641	106,157	59,521	67,450	92,095
Mar.	105,026	107,343	66 009	75,534	89,123
Apr.	110,936	107,517	70,484	75,383	91,812
May	110,119	108,535	72,747	67,646	90,865
June	111,083	107,127	78,998	63,486	87,229
July	.....	103,907	82,687	63,075	82,525
Aug.	.....	103,156	89,510	64,403	81,839
Sept.	.....	106,935	94,478	62,757	83,137
Oct.	.....	113,167	100,656	57,007	81,933
Nov.	.....	110,593	101,174	50,042	74,322
Dec.	.....	102,715	103,278	48,236	63,746
Av'ge	105,670	106,610	81,022	62,934	83,980

Pig iron production in the first half of 1917 aggregated 19,131,582 tons. This total shows a decrease of 500,000 tons from the record set in the last half of 1916, and a decrease of 250,000 tons from the total for the first six months of last year. On the basis of production during the first six months the 1917 output of pig iron will run well over 38,000,000 tons, but will not equal the record of 39,000,000 tons established in 1916.

The steel works of nonmerchant furnaces were responsible for the gain in production during June. These furnaces produced 2,398,593 tons last month, against 2,432,314 tons in May, a loss of 33,721 tons. On the basis of average daily production, however, these furnaces showed a gain of 1491 tons, the June average being 79,953 tons, compared with 78,462 tons in May. The merchant furnaces showed a loss both in total output and in average daily production. These furnaces produced 893,592 tons in June, against 942,278 tons in May, a loss of 48,686 tons. In average daily output, the June record was 29,786 tons and the May record 30,396 tons, a loss last month of 610 tons.

The average daily production of all classes of pig iron in June was 111,083 tons, against 110,119 tons in May, a gain of 964 tons.

The output of spiegel last month was 9439 tons, against 16,516 tons in May, a loss of 7077 tons. The ferro output in June was 30,885 tons, against 22,569 tons in May, a gain of 8316 tons.

The number of active furnaces continues to gain steadily. On June 30, there were 347 stacks active, against 340 on the last day of May. Six merchant furnaces were blown in and three were blown out, a net gain of three, while six steel works furnaces were blown in and two were blown out, a net gain of four. The number of blast furnaces now in blast is the largest ever recorded at any time during the past decade.

Will Build Ovens

Extensive developments at the plant of the Chattanooga Iron & Coal Corp., Dunlap, Tenn., include the construction of 150 coke ovens and the opening of three new coal mines; two on Anderson branch and one on Little Brush creek.

Will Make Crucibles

A new crucible company is about to begin operations in Chicago. The Northwestern Terra Cotta Co., one of the largest manufacturers of architectural terra cotta, has formed the Chicago Crucible Co. and has equipped a department for the molding of crucibles. Building and kilns are available for a large output and about Aug. 1 operations will be begun. The new department is being equipped by Jonathan Bartley of Bloomfield, N. J., who has had long experience in the manufacture of crucibles. He was connected with the Dixon Crucible Co. for many years, but retired some time ago from active service.

Will Get 40 Per Cent

Unsecured creditors of Josiah V. Thompson, coal land owner and president of the defunct First National Bank of Uniontown, Pa., will receive 40 cents on the dollar by the proposed sale of $13,000,000 of unsecured claims for $5,000,000 to the Great Northern railroad interests, according to Mr. Thompson. Mr. Thompson is quoted as saying that the sale will enable the bank to pay all its creditors in full.

MONTHLY PRODUCTION.

	1917.	1916.	1915.
Jan.	3,159,839	3,171,878	1,591,024
Feb.	2,649,935	3,078,548	1,666,592
Mar.	3,255,813	3,327,630	2,046,280
Apr.	3,319,809	3,225,496	2,114,518
May	3,413,677	3,364,584	2,255,157
June	3,332,509	3,213,818	2,369,932
Total 1st half	19,131,582	19,381,954	12,043,503
July	.....	3,221,127	2,563,311
Aug.	.....	3,197,838	2,774,825
Sep.	.....	3,208,041	2,834,342
Oct.	.....	3,508,180	3,120,340
Nov.	.....	3,317,805	3,035,235
Dec.	.....	3,184,178	3,201,605
Total 2d half	.....	19,637,169	17,529,658
Grand total	19,131,582	39,019,123	29,573,161

JUNE PIG IRON

States.	No. of stacks.	No. in blast last day of month.		Total tonnage made.		——Totals——	
		June.	May.	Merchant.	Non-Merchant.	June.	May.
Pennsylvania	157	135	132	265,243	1,018,542	1,283,785	1,352,775
Ohio	77	71	67	185,931	550,571	736,502	757,555
Alabama	46	32	32	147,390	86,440	233,830	259,126
Virginia	22	12	12	42,544	.....	42,544	45,381
New York	26	21	21	73,186	191,898	265,084	198,033
New Jersey	6	3	3	13,176	.....	13,176	9,485
Illinois	24	22	22	50,362	247,364	297,726	318,748
Colorado	6	4	4				
Indiana	12	12	12	32,084	248,201	280,285	292,336
Maryland	4	4	4				
Wisconsin	6	5	5				
Kentucky	7	4	4				
West Virginia	4	4	4	50,206	31,926	82,132	83,253
Tennessee	17	11	11				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	33,420	23,701	57,121	57,900
Michigan	3	3	3				
Missouri	1	1	1				
Spiegel—All states...						9,439	16,516
Ferro—All states....						30,885	22,569
Totals	427	347	340	893,592	2,398,593	3,332,509	3,413,677

Scrap Market Receding

Declines in Various Districts Range from $1 to $5—Eastern Buyer Takes 20,000 Tons—Many Dealers Short

DETAILED SCRAP PRICES ON PAGE 58

Chicago, July 3.—Pronounced declines in scrap have followed the period of relative inactivity which characterized last week's market in Chicago. Reduced prices are reported on almost all grades, ranging from $1 to $5 on the lighter grades and about $3 on the heavier grades. Steelmakers' demands have lessened somewhat due not only to the extraordinary high prices, but also to the fact that operations will be somewhat curtailed during July while repairs are being made. Approximately 150,000 tons of scrap are involved in transactions completed during the last five weeks by the leading interest. Numerous inquiries are current including several from eastern interests who have been attracted by the approximate $5 difference which exists between the Chicago quotations and those of the Pittsburgh district. Several railroads have offered tonnages aggregating some 10,000 tons. Ironmill, yard, cast and steel scrap totaling 4600 tons is offered by the Chicago & North-Western railroad. The Minneapolis, St. Paul & Sault Ste. Marie has 865 tons of miscellaneous material. A lot of 1700 tons of No. 1 relayers is offered by the St. Joseph and Grand Island railroad. Precluding the possibility of government regulations, Chicago dealers expect a revival in activities when furnaces have been repaired and when the winter buying starts.

Pittsburgh Scrap Uneasy

Pittsburgh, July 2. — Quotations on several grades of iron and steel scrap have receded slightly the last few days. Many of the larger merchants and melters temporarily have withdrawn from the market to follow developments at Washington. The belief that maximum quotations on raw and finished commodities may be fixed by the government has caused some uncertainty about the future of scrap. Moreover, many of the more important melters throughout the country discontinued buying, to conserve their own resources, when quotations advanced to historically high levels. Dealers are reported to have purchased heavy melting steel at $40 a ton, $7 a ton below the price established a week ago, although they are refusing to sell at less than $44 to $45, delivered. Quotations on rerolling rails, malleable, bundled sheets, axles, steel car wheels and No. 1 cast scrap are unchanged. Sales of No. 1 wrought, iron car wheels, machine shop turnings and borings have been made at about 50 cents a ton below previously prevailing prices. Just as soon as the general situation readjusts itself it is believed that the upward movement of prices will continue. Heavy melting steel, many dealers say, will sell at $50 a ton, delivered, before fall.

Metropolitan Market Pauses

New York, July 3.—The strong impetus in the iron and steel scrap market in this district, which has been derived from the heavy demand for heavy melting steel in the Pittsburgh district, has not been so noticeable during the past week. The principal reason for this has been the easing off in the Pittsburgh demand. On the other hand, two eastern Pennsylvania steelmakers have entered the market after having been out for an extended period. These mills only took small tonnages of steel scrap, but it is expected they will come in for much larger tonnages later. The prices realized here on heavy melting steel during the week have ranged around $35 to $36, New York, for shipment to eastern Pennsylvania and around $39 to $40 for shipment to Pittsburgh. Rolling mill and foundry grades of scrap continue strong. Prices generally are unchanged.

Eastern Plant Buys Tonnage

Philadelphia, July 2.—Following the purchase during the past week of 15,000 to 20,000 tons of heavy melting steel by a large eastern Pennsylvania consumer at around $40, delivered, the old material market in this district now is quieter than at any time for weeks past. The principal reason for the lack of activity is the falling off last week in the demand from Pittsburgh for steel scrap for shipment to that district. The latest offers from Pittsburgh dealers have been around $40, delivered, compared with $45 a week ago. Wrought pipe quotations have sagged off about $1.50 during the past week; more of this grade is obtainable than of late and large consumers consequently have reduced their offers. The tone of the market generally is easier.

Steel Drops at Buffalo

Buffalo, July 3.—With the market in an unsettled condition, dealers are predicting a lowering of prices all round on old material, and a drop in the price of heavy melting steel to as low as $35 a ton. This prediction is the result of a break in heavy melting steel whereby that grade dropped to $38-$39, a reduction of from $4 to $5 a ton. Dealers are attributing the break to the uncertainty of the government's position in regard to the steel market and the probability of federal action of some kind. The largest consumers appear to be out of the market and covered for the time being.

Trading is Restricted

Cleveland, July 2.—Dealing in scrap in the Cleveland market is restricted. Producers are offering plenty of tonnage but at prices so high that comparatively little is being taken up. Dealers who are sold short, especially since the market has stopped advancing, hesitate to buy at prices which mean large losses to them if such purchases are applied to previous sales. Heavy melting steel is quoted at $43 to $44 per gross ton, cast borings at $22 to $22.50 per net ton, and machine shop turnings $20 to $21. Attention is centered upon the iron and steel price deliberations at Washington. Whatever is decided upon is expected to have a considerable influence on the scrap market generally.

Cincinnati Market is Quiet

Cincinnati, July 2.—For the first time in several weeks no changes of consequence are to be noted in scrap quotations. While some soft spots have come to light, there has been no general change in quotations. The demand is somewhat curtailed, while the supply is more plentiful. The rolling mills are not buying as heavily as they were 30 days ago, but there is a sufficient demand for all kinds of wrought scrap to keep selling figures fairly firm. The demand for malleable scrap has been very light for some time, with few sales reported. The car shortage situation has not improved.

Sheet Traders are Losers

St. Louis, July 3.—The market for old steel and iron continues very active. While the quotable range of the various items shows no change, prices are unsettled, with the general trend upward. The unprecedented strength of pig iron has a tendency to hold up scrap values. An interesting technical situation exists in the St. Louis market. It is a notable fact that several important dealers were caught short on the recent bulge and have an enormous paper loss. These men are endeavoring to break the market. General consumption is on an enormous scale, and offerings continue very light. The only railroad offerings before the market this week were as follows: Chicago & Alton railroad,

300 tons; San Antonio & Aransas Pass railroad, 400 tons; Nashville, Chattanooga and St. Louis, 500 tons and small open list by Frisco railroad.

Southern Market is Slower

Birmingham, Ala., July 3.—While the old material market is not as active as it has been, quotations show no weakening; in fact in some lines there have been further advances. Car wheels went up $3 to $30 and $31; tramcar wheels made the same advance going to $27 and $28, and stove plate advanced $2.50 per ton, to $18. Dealers assert that they can sell all the scrap they can get but reiterate the belief that before long there will be a considerable amount of various grades for sale. Interests in other district continue to make inquiries in Birmingham. At present, scrap is still scarce. Summed up, the southern scrap market is slower but quotations are high.

War Orders

Fill Wire Nail Capacity—Independent Makers Quote $4 Uniformly

Pittsburgh, July 2.—Manufacturers of wire products in all sections of the country are operating nail machines at maximum capacity to fill orders for about 50,000 kegs distributed by the government last week. This material will be used at the numerous cantonments and will be shipped immediately upon the receipt of instructions. All independent mills now are quoting on the basis of $4 a keg for nails, at which price the bulk of the new material is being sold. Before that quotation went into effect, jobbers in all sections of the country specified briskly against contracts placed at lower figures. The American Steel & Wire Co. has made no changes in its prices.

More Ore

From Wabana Mines Will Be Available Here After Enlargements

Toronto, July 1.—The Dominion Steel Corporation has started work on the extensive improvements undertaken at its iron ore properties at Wabana, Newfoundland, with the object of increasing its annual output of ore now about 800,000 tons per year, to at least 1,500,000 tons. The outlay on the work will be about $1,500,000, which will be taken from earnings. With the increased capacity of the mine the corporation expects to be in a position to sell in the United States considerable quantities of the ore, in addition to supplying its own increasing requirements.

The Canadian Railway Department is preparing to make further shipments to France of steel rails of a certain standard weight for the construction of strategic railways, and is having an examination made by engineers of the lines in different parts of the country to determine what can best be spared. The rails to be taken up will be principally from duplicate lines or sidings.

Ore Shipments

From Lake Superior District in June Were Surprisingly Large

Cleveland, July 3.—June shipments of iron ore from the Lake Superior district proved a surprise. The total was 9,644,202 tons, an increase of 136,626 tons over June, 1915. The decrease in the 1917 ore movement, which aggregated 3,612,847 tons at the beginning of last month was thus cut down to 3,476,221 tons. The record is surprising in view of the serious delays encountered from ice obstructions in the first half of the month. The June movement is near the record month of August, 1916, when 9,850,140 tons were loaded by the fleet. The only retarding factor now is the insufficient supply of cars at lower lake ports. Some boats are being held in port several days before they can unload. The fleet's record in June would assure, if maintained, a season's movement of more than 60,000,000 tons.

No Tin Plate

Virtually Not Obtainable in Market—Few Wasters Are Selling

Pittsburgh, July 2.—Tin plate for shipment this year has become so scarce that it is regarded as a luxury. Occasionally, a few wasters are offered at prices ranging from 10c to 15c. Virtually the entire capacity of mills is devoted to the manufacture of material wanted for packing foodstuffs. It is not unlikely that American mills will be called upon to assist manufacturers in Great Britain, whose output has been reduced appreciably by the war.

Bolts and Nuts Steady

Cleveland, July 3.—Bolt and nut prices, which were advanced a few days ago, are being maintained. Rolled thread carriage bolts are now quoted at 35 instead of 40 per cent off. Rolled thread machine bolts are held at 40 per cent off instead of 40 and 10. Hot pressed, square, blank nuts are $1.90 off instead of $2.10. The other classifications have been advanced in proportion.

Wide Range

Shown in Tubular Goods Prices—Government Takes Boiler Tubes

Pittsburgh, July 2.—With virtually all manufacturers out of the market, iron and steel pipe continues to be quoted at a wide range. Mills in a position to meet specifications for shipment before the latter part of this year are selling at prevailing maximum quotations and above. Manufacturers who have made no recent changes in prices have not been active factors in the market for 60 days or longer. Demand for boiler tubes continues extremely heavy. The government is taking tremendous quantities of this material in the aggregate but is experiencing no difficulty obtaining preferential service.

The A. M. Byers Co. and the Reading Iron Co., June 30, sent out revised cards showing advances ranging from $10 to $14 a ton on standard wrought iron pipe. Iron oil country goods were advanced irregularly from $16 to $20 a ton. Advances affecting wrought iron pipe have been impending since June 18, when independent manufacturers of steel tubular goods put up quotations irregularly from $14 to $26 a ton.

Cast Buyers Come Out

New York, July 3.—A surprising result of the latest advance in cast iron pipe prices early this week, has been the appearance of more inquiry from private buyers of pipe than has been current in the market for weeks past. The buyers in some cases say they are anxious to close before the market has a chance to move to still higher levels. Plans now are being worked out for the army cantonments to be located at Yaphank, L. I., and Wrightstown, N. J., and it is expected that some estimate of the amount of pipe to be required for these cantonments will be made during the next week or two. It is understood that an additional tonnage of pipe is to be purchased for the cantonment at Ayer, Mass. No new municipal lettings of importance have occurred of late. The market generally continues at $65.50, New York, for 6-inch class B and $68.50 for 4-inch class B.

Few Pipe Sales Made

Chicago, July 2.—A sale of 300 tons of 4 and 6-inch cast-iron pipe to the government for use at the Great Lakes training station is practically the only business that has taken place recently. No further price advances have been announced. Buying is generally retarded by the present high prices, although during the past few days there have been a few inquiries along this line.

Spare the Steel

Says Chamber of Commerce or Supply Will Not be Sufficient

Washington, July 3, 1917.—Increased war demands far beyond those generally supposed and inability of the mills to meet the requirements of this country and its allies, forms the basis for an urgent plea that steel be used for general business purposes and then only when absolutely necessary by a committee of the chamber of commerce of the United States co-operating with the council of national defense. Waddill Catchings, of New York, president of the Sloss-Sheffield Steel & Iron Co., and former assistant to E. R. Stettinius, of J. P. Morgan & Co., New York, recently in charge of purchases in this country for the allies, is chairman of the committee.

Mr. Catchings says that the rapidly developing steel situation "will probable make it impossible for those general manufacturers, unable to find a steel substitute, to secure adequate supplies of steel and may even make it impossible to secure any." Further, he says: "No substantial increase in production is anticipated. Even maximum production from existing facilities cannot be expected because transportation, labor and material conditions will interfere with the full operation of the plants.

Railroads Buying

New York, June 30.—Orders for railroad equipment placed in June totaled approximately 9000 new cars. These included 4250 box, some 2800 gondolas and 1000 coal cars. In addition an order was placed for rebuilding 1500 wooden cars and the Canadian government placed orders for 5000 miscellaneous cars with the Canadian Car & Foundry Co. Nothing further has developed with respect to the proposal that the United States government purchase 100,000 cars, and it is considered unlikely now that this plan will be carried out. Orders placed in June included 164 locomotives, 101 for export and 63 for domestic roads.

Rail lettings during June included only a few thousand tons. Very large inquiries are out from domestic railroads, however, for 1919 requirements. It is expected that this business will be concluded shortly at higher prices than those now prevailing.

Spikes Advance Sharply

Pittsburgh, July 2.—A sale of 25,000 kegs of standard railroad spikes was made a few days ago at 4.75c, $10 a ton above the prevailing minimum price, and smaller lots have been sold at 5c. One of the leading spike makers is reported to be out of the market for an indefinite period and this has tended to stimulate prompt demand. Small spikes are selling at the usual differentials. Virtually all makers of light steel rails have withdrawn from the market for shipment this year, and some mills cannot promise deliveries until the second half of 1918. Light rails are quoted at as high as $80 for sections weighing 25 to 40 pounds.

Rails Sold For Cantonment

Chicago, June 30.—A contract for 350 tons of 60 to 70-pound rails, including track fastenings, for the Des Moines, Ia., cantonment has been awarded to a Chicago railmaker. Deliveries will be made immediately. A small sale of relayers was made last week at $60. The Chesapeake & Ohio railroad has issued an inquiry for 1000 gondolas. The Grand Trunk railroad has not closed on the inquiry of last week for 1000 box cars.

Car buying, in general, seems to be at a standstill pending a decision on the government's proposed plan to place 100,000 cars. Chicago steel men seem to favor this plan, although they point out that actually to relieve the traffic situation, the government would also have to supply a large number of locomotives.

The American Locomotive Co. has taken an order for seven locomotives for the Kansas Southern railroad and the Baldwin Locomotive Works for 10 for the Chicago & Alton.

Sell Rails at $70

Cleveland, July 2.—A small sale of 60-pound standard steel rails was made recently at $70, mill. The accompanying splice bars were sold at 5.50c and the bolts at 7.50c, mill. Some opinion is expressed that when general selling of rails for 1919 delivery a new price will be announced.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, July 2.—Among the most important developments of the past week in connection with metal markets was the announcement that the government had arranged through the council of national defense for one month's requirements of copper amounting to 30,000 tons, at 25c a pound. Another market feature was a letter sent out by the zinc committee of the council of national defense asking spelter producers to participate in supplying the requirements of the army ordnance department to the extent of 23,500,000 pounds of Grade A, for delivery over 10 months, at 13.50c. As the arrangements governing the nation's war requirements are the principal, if not the only consideration in the metal markets at present, these developments have been accorded much interest.

The effect upon the copper thus far has been negligible, for the trade has been unable to receive official confirmation as to whether the price of 25c is conditional upon the federal trade commission's investigation of production costs. In the meantime the electrolytic market is marking time, with quotations about as follows, on the basis of cash, New York: Spot, 32.50c; July, 31.50c to 31.75c; August, 31.25c to 31.50c; September, 30.25c to 30.50c; fourth quarter, 29c to 29.25c. Prompt prime lake continues quoted nominally 32c to 32.50c. Prompt casting is quoted 31.50c to 32c.

Despite the fact that the present government allotment of high grade is to be taken at 13.50c, or 2c advance over the previous allotment, sentiment in the spelter market has not responded. Prime western has eased off perceptibly the past week, sales at 9c, St. Louis, having been made, while 8.87½c is bid. Supplies of prime western continue large, with demand extremely light. Prime western quotations are about as follows: Prompt and July, 9c, St. Louis; August and September, 9.12½c. Brass special, prompt delivery, is quoted about 9.75c to 10c, St. Louis.

Following the recent arrangement of the government's lead needs until Aug. 1 at 8c a pound, the larger producers have experienced an active demand, some of them now being practically sold up for July. These producers lowered their asking prices to 11.25c, St. Louis and the market excitement subsided. Quotations are about as follows: Prompt and July, 11.25c to 11.50c, St. Louis; August and September, 11.25c.

Although the government has taken steps to arrange for part of its copper, lead and spelter needs, the antimony trade has remained in suspense. One or two government inquiries have been reported, but none closed and sellers are in doubt as to how this metal will be purchased. Spot prices have declined further, sales at 18c duty paid and even a fraction lower being reported. Little trading is reported in futures, prices being practically unchanged from a week ago. Quotations for Chinese and Japanese brands for future positions are about as follows: June shipment from the far east, 15.75c, in bond; July, 15.37½c; August, 15.12½c.

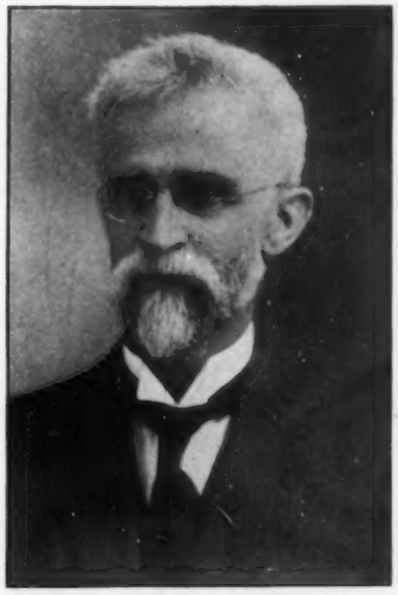
Aluminum demand has been light for several weeks and prices for virgin metal have receded slightly, sales at 59c being reported. Quotations are about as follows: No. 1 virgin, 59c to 61c; No. 1 remelted, 57c to 59c; No. 12 alloy, 42c to 44c.

The tin market has been almost at a standstill, the past week. The tin committee appointed by the American Iron and Steel Institute has made no announcement as yet with regard to distribution arrangements. During June spot Straits prices fluctuated between 60.50c and 64c, the present price being about 62.25c to 62.50c.

How Gages For Big British Shells Are Made

BACK of any great industrial enterprise, and war is after all an industrial undertaking, there are hundreds of closely co-ordinated factors, each adding its share to the well-organized machine. Without the infinite care and painstaking effort of each unit, some important function of the smooth-working whole would be faulty. It is for this reason that on the battle-front the appalling detail of munitioning an army is lost in the thunder of the big guns and the merciless crack of the rapid firers. If it were not for the close co-operation between every industry connected with the task of building a fighting machine, and the constructive efforts of thousands of skilled artisans, the value of men, ships, guns and the intricate mechanisms of war would be lost.

Unquestionably, gagemaking presented one of the greatest problems that our allies had to solve at the outset of the war. Though far removed from the battlefronts, the work of the gagemakers is of vital importance. Upon them depends as much as upon the crack regiments and so closely co-ordinated are they that one is helpless without the other. Great Britain called upon the neutral world as well as upon her dependencies for mechanics skilled in the art of gagemaking. She was answered from the four corners of the globe. Small shops employing a few men offered their services; great industrial plants with the facilities and the men capable of doing this high type of work, were pressed into service and their task was and still is enormous.



JOSEPH DOVE-SMITH SR.

Joseph Dove-Smith, president of Dove-Smith & Son, Niagara Falls, N. Y., was among the first to offer his resources to the Imperial Canadian government. They were accepted, and in this small plant, gages for

FIG. 1—PRECISION LATHE WITH GRINDING WHEEL MOUNTED BETWEEN SPINDLES

Gagemaking Tools

Equipment installed on the first floor of the plant of Dove-Smith & Son includes the following machines:

Two 12-inch screw-cutting lathes,
One 14-inch screw-cutting lathe,
One 16-inch screw-cutting lathe,
One 20-inch screw-cutting lathe,
One universal milling machine,
One Lincoln-type miller,
One plain milling machine,
One universal grinder,
One 2-head grinder,
One surface grinder,
One special grinder,
One 16-inch shaper,
One 14-inch and one 26-inch drill press,
One high-speed drill,
One 4-foot x 14-inch x 14-inch planer,
Complete oil-fired heat treating equipment including blowers and condensers.

every type of shell and time fuse used by the British forces in France up to and including the 9.2-inch British light high-explosive shell have been made. Approximately 236 gages are necessary for the British time and percussion 80 mark 7 fuse. Every one of these gages must be correct to within 0.0002-inch. The layman labors under the impression that it is a comparatively simple matter to make a gage to these requirements. In so far as the machining operations alone are concerned, his opinion is substantially correct, but the heat treating and finishing operations must be conducted with the greatest skill. No gage is finished on the lathe or grinding machine. These tools do the roughing work, and the final touches are all done by hand. A unique solution of the labor question has been applied in the Dove-Smith plant. It was found exceedingly difficult to secure men for the fine work of lapping the gages to size. The work was particularly trying and after spending considerable time and money on the problem, women were employed. Many persons laughed when they heard the news; it had never been done before. Moreover, what did women know about thread micrometers and plug fits? It is a curious thing, however, that in lapping thread gages to size, no better workers have been found than women, and they play an important part in the organization.

Shop Equipment is Complete

The plant of Dove-Smith & Son occupies a plot approximately 50 x 75 feet. The present 2-story building has been recently supplemented by a 1-story addition. Ground is available for larger quarters and plans are now being considered for a 3-story building which will be devoted exclusively to the manufacture of gages and special tools.

At present the entire capacity of the Dove-Smith plant is engaged in turning out gages and special form tools for use on British munitions. In an accompanying illustration, Fig. 3, a tool for turning the inside diameter of a 6-inch B.L.H.E. shell is shown. The fixture, which is clearly shown in Figs. 7 and 8, was specially designed for mounting six cutters at one time, when these cutters are being formed on the milling machine. Mounted in a Lincoln miller, made by the Pratt & Whitney Co., Hartford, Conn., these cutters are formed in the rough. They are then mounted in the jig shown at the right

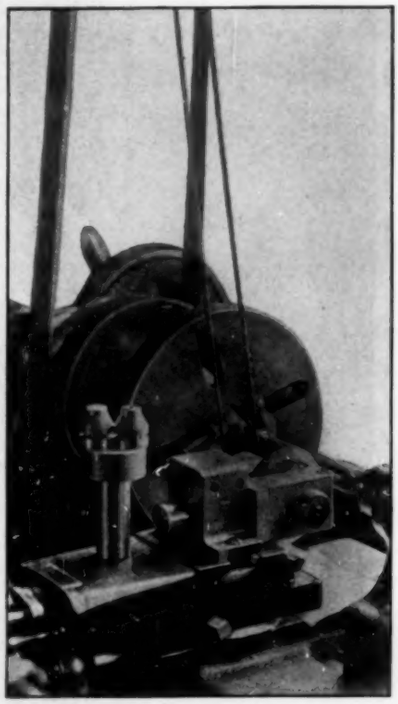


FIG. 2 — STEEL WHEEL USED ON THREAD GAGES — DRESSING DEVICE SHOWN AT THE LEFT

in Fig. 3. This jig consists essentially of a perfectly flat bearing surface which in turn rests on a second plane surface plate shown on the table of the grinder in Fig. 4. The bottom plate, *A*, Fig. 4, of the jig is a master for the cutter. This master is gaged to the correct size and is used as a pattern for grinding the rough cutting tool. The flat plate, *B*, Fig. 4, upon which the jig rests, has a standing edge, *C*. A grinder made by the Automatic Machine Co., Bridgeport, Conn., carrying a carborundum cup wheel is used to grind the rough cutter. The master cutter is pushed up against the standing edge, *C*, and any oversize on the rough cutter is removed. In this way a cutter may be ground very close to limits. In addition to the cutters described, special forming tools are made for use on time fuses and small parts of time fuses. The greater activity, however, of the Dove-Smith plant is centered on the production of gages.

Gagemaking a Science

Thread gages are undoubtedly the most difficult to produce. The chance for error in a thread gage is ever present, and it is only with the greatest care that a gage of this type can be made. The stock for the usual thread gage is ordinary carburized machine steel. Unless so specified, tool steel is not employed. Thread or screw gages are made from screw stock unless otherwise ordered. The stock is first cut off in lengths, centered and knurled on a lathe. These pieces are then heated to approximately 1300 degrees Fahr., and allowed to cool slowly in air. These pieces are allowed to stand as long as possible to insure maximum accuracy when finished. In most cases, the steel is allowed to stand at least 10 days after the first heating unless circumstances prevent. The steel is then turned to shape within 0.015-inch and heated to 1300 degrees Fahr., and allowed to rest as before. After standing at least 10 days, the first thread is then cut. In order that the threads may run true and be identical, a unique device has been installed on all the screw-cutting lathes. A strong, flexible wire is attached to the carriage upon which the cutting tool is mounted. This wire is carried to the end of the lathe and run over a small roller. On the end of the wire a weight is attached which keeps the wire taut at all times. In this man-

Tools for Gages

Machines in use on the second floor of the Dove-Smith plant are of a lighter type than those on the first floor and include the following:

One 10-inch lathe,
Two 12-inch lathes,
Two 14-inch lathes,
One special backing-off machine,
One special speed lathe,
One surface grinder,
One shaper carrying a high-speed grinding wheel used for surface grinding,
Four precision lathes,
Two high-speed drills,
One universal grinder,
One universal grinder with special equipment for grinding snap gages.

ner the carriage is always held against the lead screw and on the same side of the screw. It is said to be practically impossible to keep a lead screw in perfect condition, and the presence of play will seriously interfere with the production of accurate threads, but through the use of this device, threads of a uniform character are secured.

After standing 10 days or two weeks the rough formed pieces are taken to the precision lathes and turned down to within a few ten-thousandths of an inch. In the case of small gages, they are finished to within 0.0004-inch; larger pieces are finished to within 0.0007-inch or 0.0008-inch, depending on the size. On a few sizes which are to be used for neavy work, as much as 0.0012-inch is allowed.

When this precision turning has been done, the stock is then carburized at 1700 degrees Fahr. The time taken for this heat treating varies from ½ hour to 2½ to 3 hours, depending upon the size of the piece. The stock is then allowed to stand as long as possible. Two weeks is the minimum time for rest, and if circumstances permit, three weeks are taken for this period. After each of these operations, close inspection is made of the stock. Any defects in the steel usually appear in this time, and extreme care is taken with each gage before allowing it to progress beyond this operation. It is from this point on that the greatest time and effort are spent on the gages, and it is highly necessary that the stock be perfect. If no defects are found, the threads are carefully polished and inspected. Another heat treatment is given the stock, this time at approximately 1500 degrees Fahr., and the piece is then quenched in water. The thread gages are now ready for grinding and lapping.

After being quenched, the piece is ground to within 0.0003-inch of the finished size. The equipment for grinding fine thread gages is very delicate and extreme care must be exercised in the use of the steel wheel, which is shown unmounted at the left in Fig. 5. The knife-like edge of this wheel must be carefully dressed before using, and the device by which this is done is shown standing on the carriage in Fig. 2. The grinding wheel is shown mounted and a thread gage ready to be ground is between the spindles. The grinding wheel is driven from a high-speed electric motor, connected direct to the lighting circuit. In Fig. 5, at the right, is shown a device which is used to hold the tools used in cutting the threads on the screw gages. It is claimed by the Dove-Smith superintendent that it is not humanly possible to hold a cutting tool rigidly and truly enough to grind it on the ordinary type of grinding wheel. Consequently, the tool-holding device shown was developed, and is used on a Brown & Sharpe surface grinder. One side of the fixture is used for holding tools for U. S. threads and one side for Whitworth threads.

It is said that no thread gage can be ground to an accurate finish, and that is the reason why lapping must be resorted to to produce a perfectly smooth surface. The surface of ground work is ridged and it is necessary to plane these ridges out before a perfectly flat surface can be secured. It is believed that the jump of the belt and the inequalities of the surface of the grinding wheel produce this condition and that lapping eliminates it. On all gages up to and including 1½-inch, lapping is done by women, who have been trained particularly for this work. Supplementing this, the women test the thread gages for size. Needle testing is practiced for size and shape of threads, thread micrometers are used

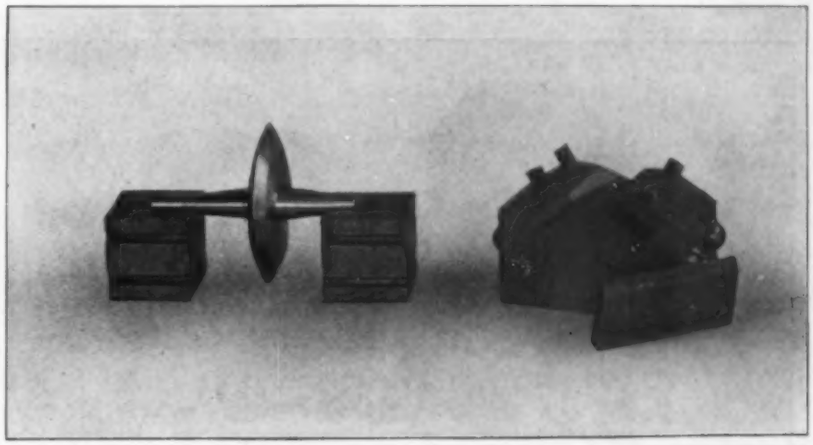


FIG. 5—LEFT, UNMOUNTED STEEL WHEEL USED FOR GRINDING THREAD GAGES—RIGHT, DEVICE USED TO HOLD THREAD-CUTTING TOOLS WHILE GRINDING

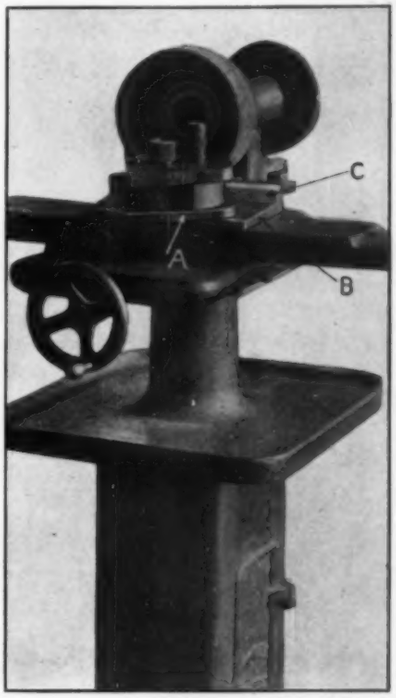


FIG. 4—CUTTER MOUNTED IN JIG ON GRINDING MACHINE

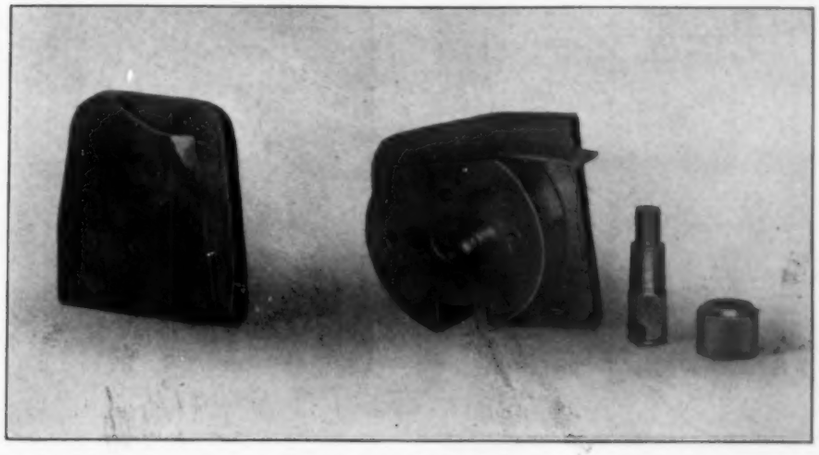


FIG. 3—LEFT, TOOL FOR TURNING INSIDE DIAMETER OF 6-INCH B. L. H. E. SHELL—RIGHT, JIG USED FOR HOLDING CUTTER DURING GRINDING

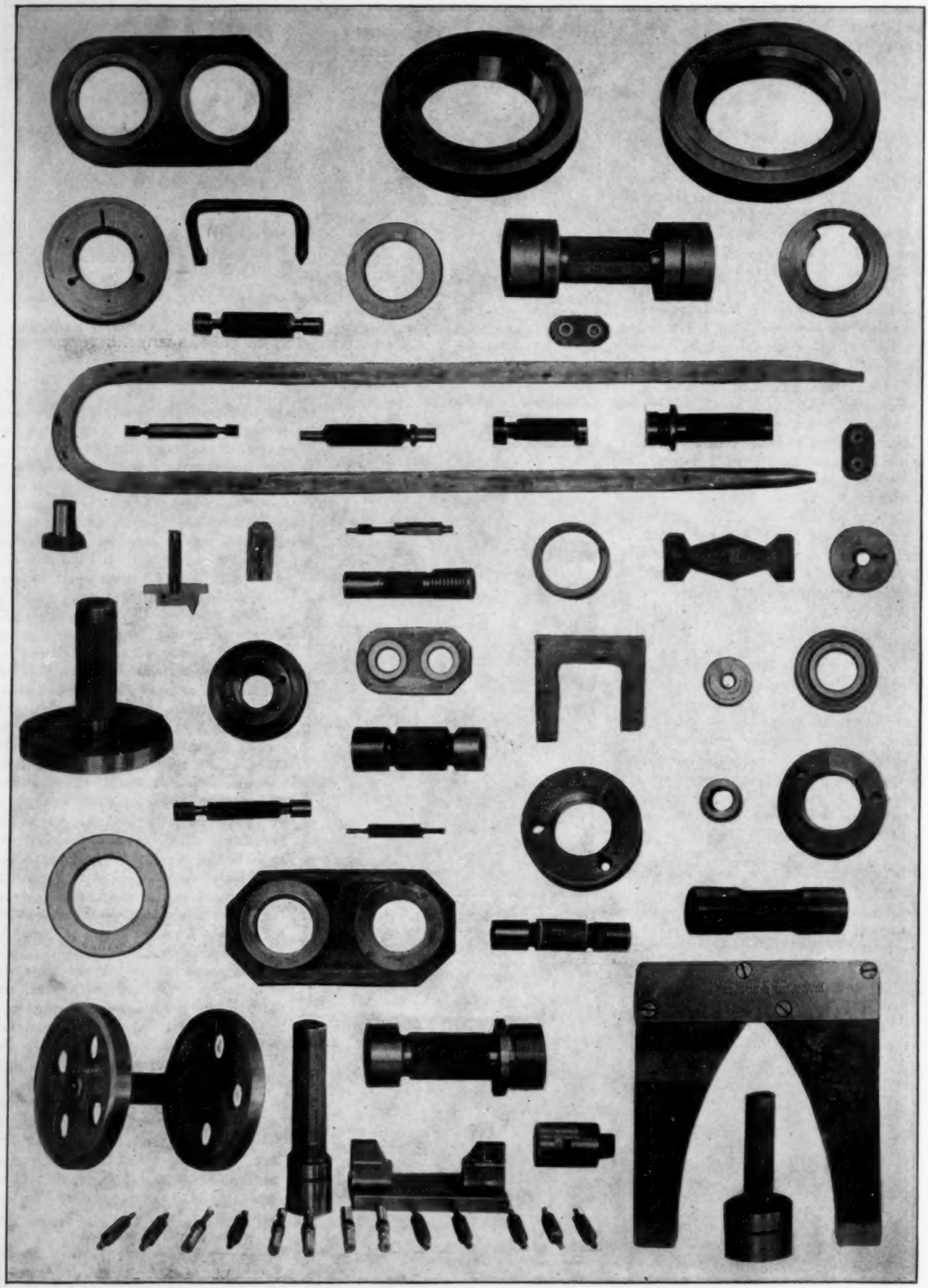


FIG. 6—A FEW OF THE GAGES NECESSARY TO INSPECT A COMPLETE 6-INCH B. L. H. E. SHELL

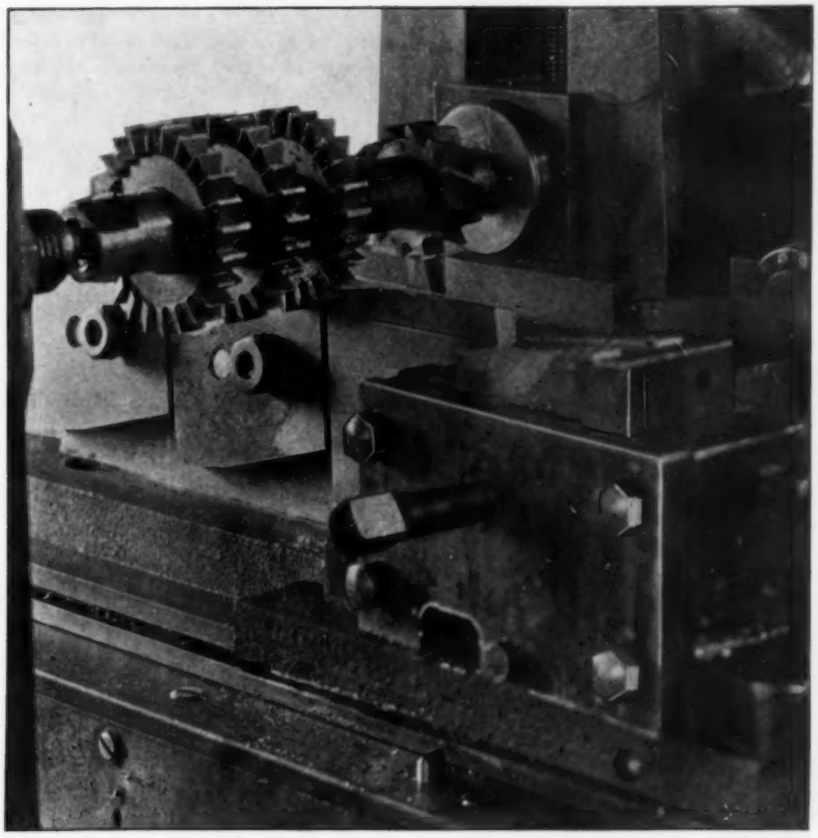


FIG. 7—FIXTURE AND METHOD OF MOUNTING CUTTERS ON MILLING MACHINE

to show that the threads are not tipped. One system is used as a check against the other. The preparation of the needles used in the three-needle system involves a great amount of care and accuracy. Needles of approximately the size desired are purchased and three of these are then selected and lapped to size. Four sets of needles are used to measure the threads of the same gage. By taking each size, the gage may be checked on every thread and practically any deviation noted. Eight sets of needles are constantly in use, four are U. S. thread checks and four are used on Whitworth threads. The smallest of these needles are 0.014-inch in diameter.

In nearly all cases an allowance is made for lapping the gage and usually not more than 0.0005-inch is allowed for this purpose. Great care must be exercised in this final process, and it takes sometimes three or four hours to draw a thread gage down to size. In this connection it is interesting to note that hardness of thread gages must be uniform. A thread gage that is too hard will give trouble to the lapper. The first thread on the gage is only partially formed and if the steel is brittle, the fine, knife-like edge of the thread is likely to chip. This means the discarding of this gage. A gage that is too soft will not pass inspection, therefore the work of the heat-treater is closely confined. A gage that is faulty will not be corrected by lapping. It must be perfect before it leaves the lathe.

Master gages must be made for every working gage, regardless for what purpose the working gage is to be used. The manufacture of master gages is the most trying of the toolmakers' work. A gage corresponding exactly to the specifications of the working gage is first made. After this gage has passed government inspection, if the working gages are to be used in munition plants, a master gage is made from the inspected and o.k.'d working gage. This master gage must make a perfect fit over the working gage and the limit of variation is so close that it requires the utmost skill to produce a perfect fit. The master gage is then submitted for government approval. If it is approved, an exact duplicate of the master is made and placed in safe keeping. All working gages of the same pattern must pass into or over the master, which is frequently checked with the master gage which is in storage.

In the full-page illustration, Fig. 6, are shown a few of the gages used on British 6-inch B.L.H.E., or British light, high-explosive shells. The long

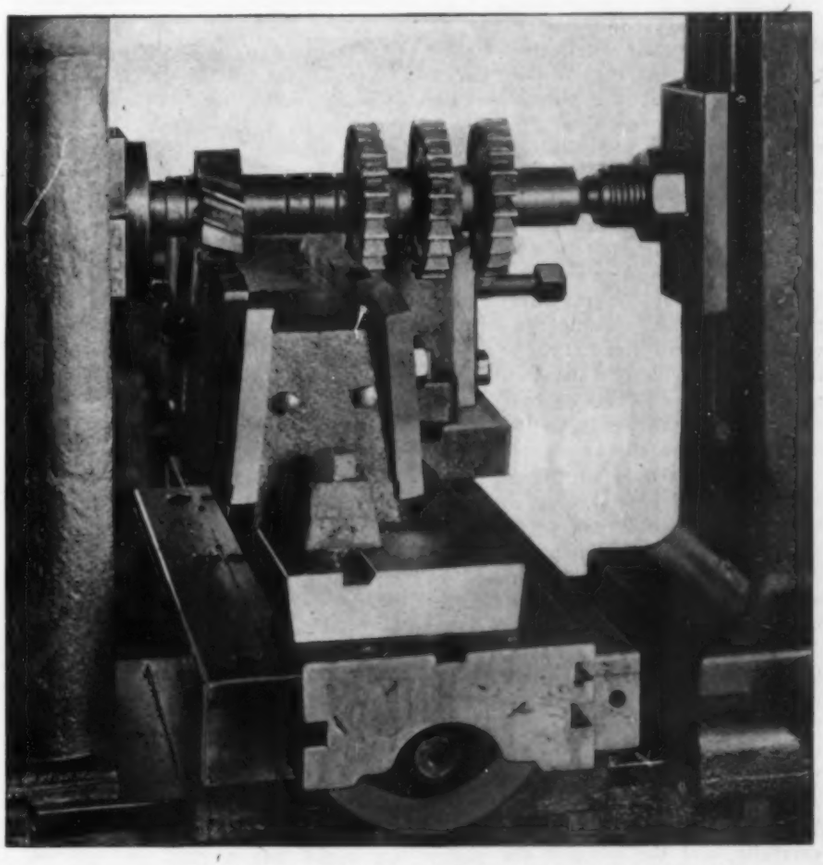


FIG. 8—CUTTERS MOUNTED IN MULTIPLE ON MILLING MACHINE

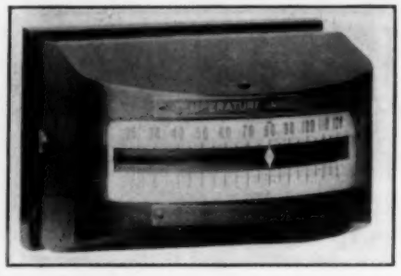
2-pronged gage in the center of the illustration is used to gage the depth of the finished shell. In the extreme right-hand corner of the illustration is a nose profile gage. Directly under the right prong of the depth gage, a double pyramid-shaped gage is shown. This is used to test the angle of the seat and the profile of the nose on a 6-inch British light high explosive shell.

The lathe used to produce this gage is shown in Fig. 1, and is the ordinary precision tool with some special attachments. The wheel which is mounted between the spindles is an ordinary fine-grained grinding wheel, but the polishing wheel, which lies on its side in the foreground of the illustration, is made of copper. A device for correctly placing the edges of this profile gage at the proper angle for grinding is installed on this lathe and may be seen in the background. This consists of a series of pivoted arms set at predetermined angles. By moving the arms forward and back, the gage which is clamped on these arms, is moved forward and back on an angle, permitting the wheel to cut on that radius. The copper wheel is used for polishing and bringing the gage to within certain limits, after which it is lapped by hand.

Setting a Record for Accuracy

All plug gages and ring gages go through practically the same course of treatment as the thread gages. Extreme care at all points in the manufacture of such a product is vitally necessary, and that is why in two years of continuous gagemaking Dove-Smith & Son have had only four gages rejected by the Imperial Canadian government. It would seem that delicate thread gages, plug gages and ring gages that have taken months to make would be treated with care at all times. As a matter of fact, they must stand use and abuse, for time is the important consideration in the production of munitions. Through the courtesy of Fred H. Adams, manager of the St. Catharines Steel & Metal Co., St. Catharines, Ont., the writer was afforded the opportunity of following the progress of a 6-inch shell through its various stages of manufacture, including the inspection prior to shipment abroad. Dove-Smith gages are used almost exclusively in this plant. In the plant of the Packard Fuse Co., St. Catharines, Ont., about 50 girls work incessantly checking time and percussion fuses which are shipped at the rate of 10,000 a day. It cannot be said that the gages are handled carefully, and the moment the slightest error is detected, due to wear or abuse, the gage is scrapped.

No story of gagemaking at the plant of Dove-Smith & Son would be complete without mention of the man who made that organization possible. Joseph Dove-Smith received his early training in England. Through years of effort at the trade of mechanic he became superintendent of John Holroyd & Son, Manchester, Eng., in 1894. Speaking of his experiences in that company, Mr. Dove-Smith said: "I don't believe there were a pair of micrometer calipers in use in a single shop in England. We worked with the steel rule and calipers and it was necessarily a hit and miss sort of an arrangement. When I saw what was going on, I sent to Brown & Sharpe, in the United States, and bought 100 pair of micrometers. I sold them to my boys at a shilling a week. It wasn't long until my shop was nailing a reputation on the wall for accurarcy



TEMPERATURE INDICATOR FOR ELECTRICAL MACHINERY

of workmanship that has never left it through all these years."

And while he was talking he rang for the superintendent of the plant. When that energetic individual appeared, Joseph Dove-Smith Jr., the older man asked for the pair of thread "mikes" that would be found in the inspector's desk on the second floor. After he had carefully opened the case, as if he feared to drop the contents out of its worn velvet lining he held up a pair of shining thread micrometers. "There," he said, "is the instrument I used as superintendent of the plant of John Holroyd's. That was in '94, and they are just as good today as when I bought them. We had to change them when we started to make gages. They used to be just plain 2-inch micrometers, but thread micrometers were so scarce that we remodeled them and put a thread anvil on them and used them for our final inspection. They have to be right in that department, and I haven't found the time when they were not right up to the scratch. Then when Brown & Sharpe brought out their new thread measuring tools and we could buy a pair, we laid these aside, just about a month ago, but they'll do duty just the same."

Known as "the governor" to his men, he meets each of his employes on a basis of equality. There is not one among them who would not bend every effort to please; long hours if necessary, all night if occasion demands, each is eager to please "the governor". He goes about the shop with a kind word for all and takes a particular interest in every job going through his plant. His co-operation with his men has made it possible to derive the greatest amount of excellent workmanship from them.

Temperature Indicator for Electrical Machinery

The General Electric Co., Schenectady, N. Y., has developed a temperature indicator which when used in conjunction with temperature coils, affords a convenient and rapid means of indicating continuously at the switchboard the temperature of various portions of the windings of electrical machinery under operating conditions. In accordance with recommendations of the American Institute of Electrical Engineers, it is now standard practice to furnish temperature coils with all alternating-current machines having a stator core of 20 inches or more in width, a voltage rating of 5000 or higher or a capacity of 500 kilo-volt amperes or greater.

The new temperature indicator is a direct-current differential indicator with three terminals. Operation depends on the variation of resistance of a copper resistor placed in a slot of the machine stator in contact with the insulation of the winding, or in any location external or internal where the resistor may be protected from the conductors, by suitable insulation. The increase or decrease of temperature of the windings causes a corresponding change in resistance of the coil which is indicated directly by a sensitive instrument, through a graduated Centigrade dial.

One of the windings of the temperature indicator is in series with a coil of manganin, having a resistance equal to that of the temperature coils (usually at 80 degrees Cent.). The other winding is in series with the temperature coil itself. When the temperature in the copper coil rises, the current in the branch of the circuit carrying the temperature coil decreases, causing a corresponding deflection toward the higher temperature markings on the indicator scale. The reverse occurs when the temperature of the temperature coil

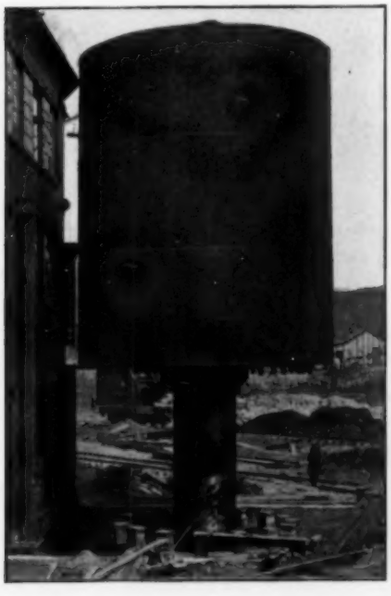
falls. The scale of the standard instrument is adjusted with a range of either 20-120 or 0-90 degrees Cent., and is marked in 1-degree divisions.

Rivet Cutting Attachment

For cutting off rivet heads and staybolts flush with plates, by the oxy-acetylene process, it is desirable to have a cutting tip so designed as to permit of the gas jet playing parallel with the surface. To meet this need the Prest-O-Lite Co., Inc., Indianapolis, has designed a special cutting attachment, which is shown in the accompanying illustration. This attachment is screwed into the head in place of the regular cutting nozzles. The copper tip is bent at a convenient angle and is adjustable to any position, facilitating operation in close quarters. Much cleaner work in rivet and staybolt cutting is said to be possible with this attachment than with standard cutting tips which do not permit of a cut parallel with the plates.

Builds Large Accumulator

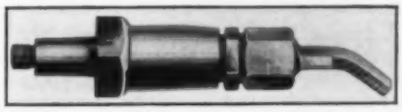
A large hydraulic accumulator, which was recently built by the Southwark Foundry & Machine Co., Philadelphia, is shown in the accompanying illustration. This accumulator has a capacity of 3000 gallons of high pressure water at 1000 pounds per square inch pressure. The ram of the accumulator is 5 feet in diameter and 28 feet long and weighs 120,000 pounds. The cylinder, which is of open-hearth steel, weighs 140,000 pounds. The main plate is 18 feet in diameter and weighs 85,000 pounds. The tank, which is 20 feet in diameter and 24 feet high, is supported by 24 tie rods. The water enters the accumulator in the center of the bottom, being forced through a pipe extending upward into the cylinder, while the water is discharged through a side outlet. This accumulator complete, not including the ballast, weighs 450,000 pounds and requires 1400 tons of ballast to give 1000 pounds pressure.



3000-GALLON ACCUMULATOR

Automatic Plunger Press

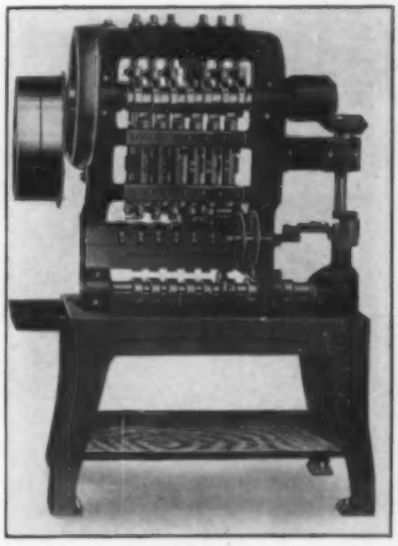
Automatic multiple plunger presses built by the H. E. Harris Engineering Co., Bridgeport, Conn., are designed for the rapid production of stamped, perforated and embossed sheet-metal parts. These machines, one of which is shown in the accompanying illustration, have camshaft speeds of from 65 to 150 revolutions per minute which permit of outputs varying from 35,000 to 80,000 parts in a 10-hour day, allowing time for setting-up and for sharpening tools. The machine consists of a heavy main frame carrying a number of press plungers operated by a cam shaft which determines the timing and the throw of the plungers. These plungers carry the different punches for blanking, embossing, piercing, drawing, etc. The bolster fitted on the bottom part of the main frame, holds the different dies to suit the punches and carries the transfer slide.



THIS TIP ALLOWS JET TO PLAY PARALLEL TO SURFACE

English Tool Builders Specialize

According to United States consul, Augustus E. Ingram, Bradford, England, a movement has been initiated by the Association of British Tool Makers for a greater degree of specialization among machine tool builders. It is reported that 10 machine tool firms have arranged among themselves that each shall devote itself to the production of a single type of machine. One company will confine itself to drilling machines, another to boring metals, etc. It is expected that the new arrangement will reduce the number of patterns and drawings to be kept and will permit the production of machine tools on a manufacturing instead of a jobbing order basis. The arrangement is also said to lend itself to the appointment of group publicity agents and travelers both at home and abroad. The carrying of foreign trade through the medium of independent general agents has proved far from satisfactory, but, hitherto the majority of machine tool makers have had to rest content with that means for the reason that their turnover was not large enough to bear the expense of having a special agent in the leading foreign centers.

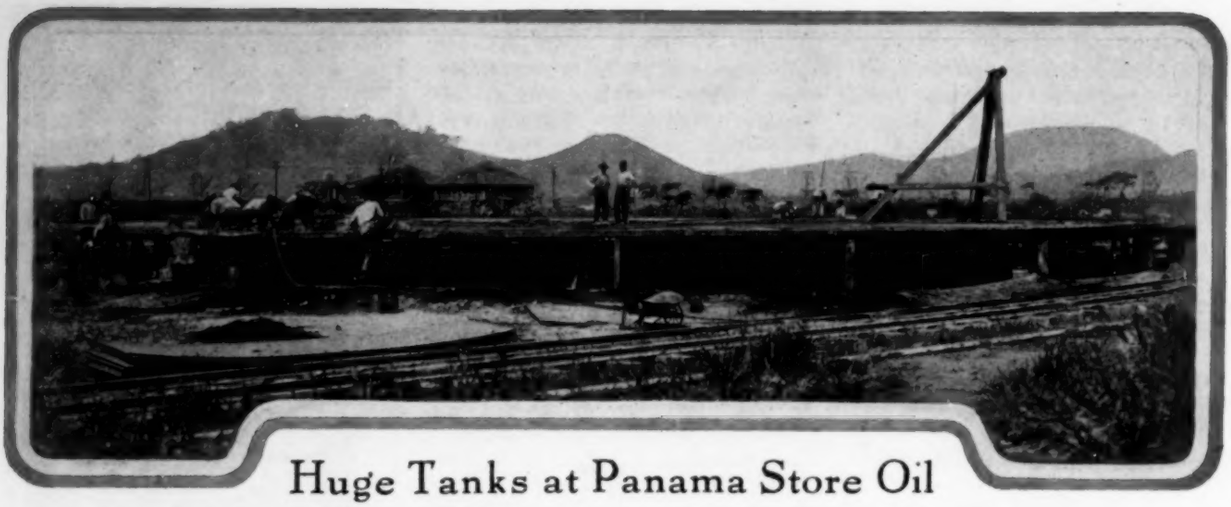


MULTIPLE PLUNGER PRESS

Chinese Mills Hampered by Old Methods

Coke is produced for the steel works at Hanyang, China, in old-style ovens which have a capacity of 650 tons of coke a day, according to a recent commerce report. Great savings could be effected in this plant by installing modern equipment to replace the present ovens which are of both the native and the foreign type. With the native ovens, 63 per cent of the coal can be turned into coke; with the foreign ovens, 67 per cent of the coal can be realized as coke while, if the modern by-product ovens were installed, 70 per cent of the coal, it is estimated, could be made into coke. Four days are required to produce coke in the Chinese ovens, 48 hours in the foreign ovens and 18 hours in the modern ovens.

With the present installation none of the by-products from the coke are utilized. The gases are used to furnish fuel for operating engines, but other products of the process are allowed to go to waste, including the percentage of coal which comes from the washing plant which might profitably be reduced to gas for the purpose of running an electric power plant of some size. A proposition that was made for the modernization of this plant has been discarded for the present because of the prohibitive cost of installing a modern by-product plant.

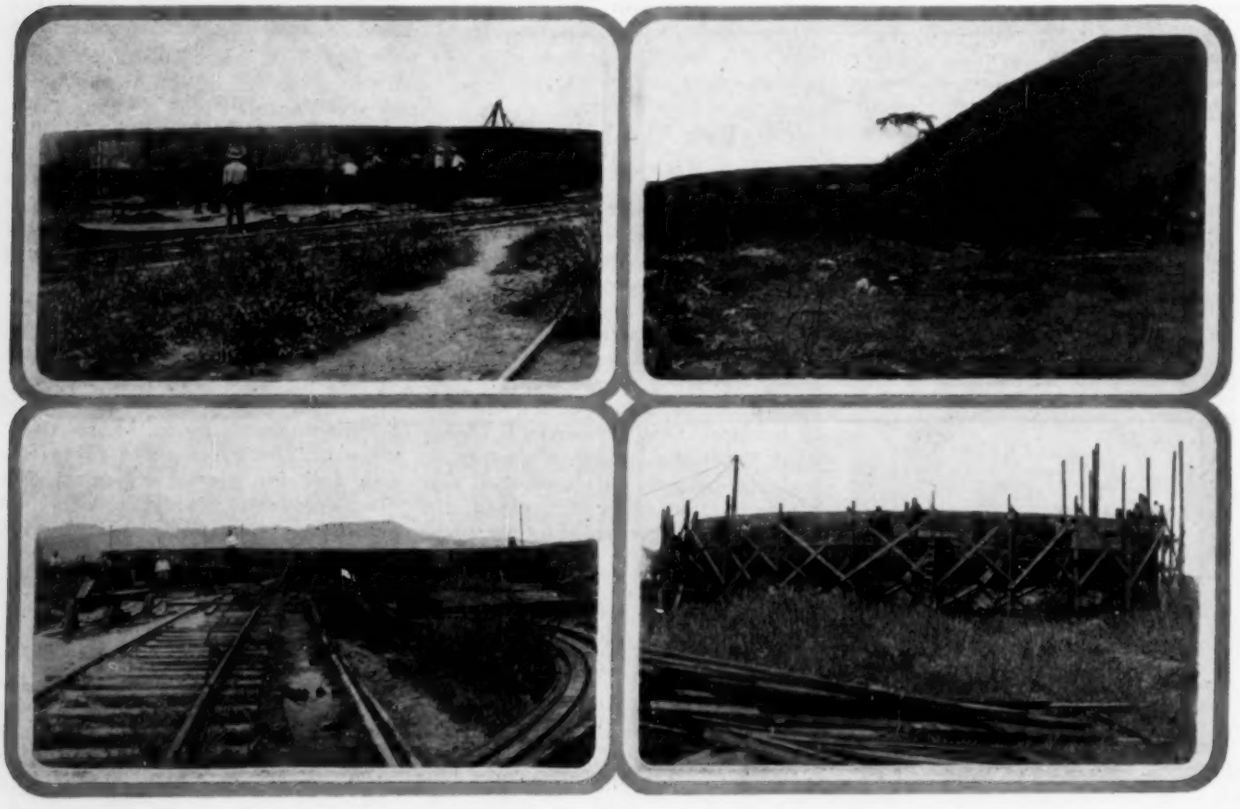


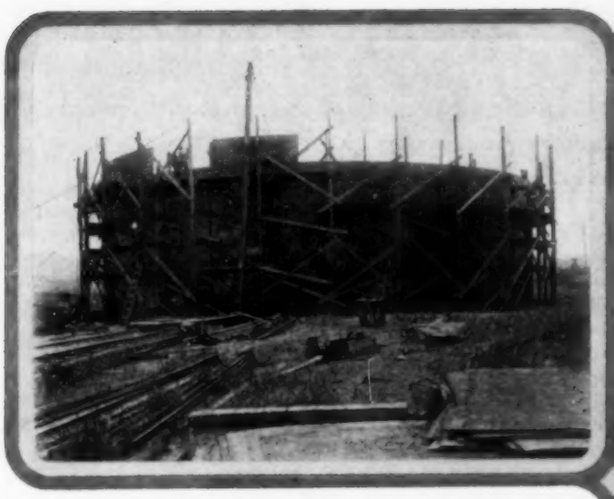
Huge Tanks at Panama Store Oil For Uncle Sam's War Dogs and Commerce Carriers

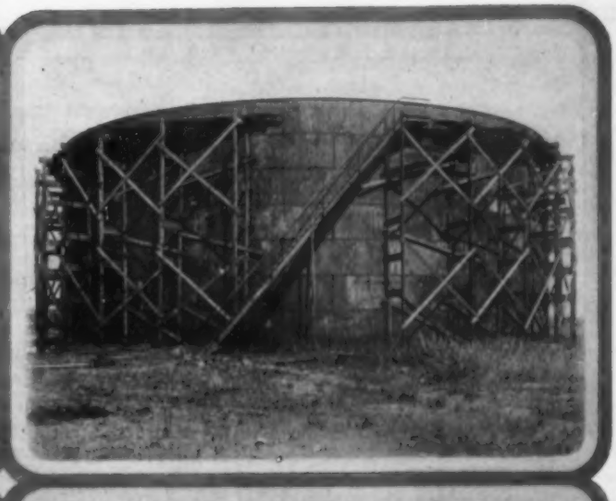
WHEN Columbus shipped a mutinous crew and unfurled the sails of the NINA, PINTA *and* SANTA MARIA *as he set forth to discover a new continent, the breezes carried him to the land he sought. And Columbus knew that in their own leisurely way the winds would bring him back to his queen. Nature furnished kinetic fuel for his fleet, so the problem of securing coal or oil for the return trip never bothered Columbus or his brother navigators. Man, however, in the intervening centuries has improved upon Nature's original scheme of maritime locomotion, but not without introducing several complications. Unfortunately, the cruising radius of modern vessels operated by steam from oil or coal-fired boilers is limited by the capacity of their oil tanks or coal bunkers.*

Progress consistently demands that once a complication is inaugurated, means be taken to simplify it. Therefore we find at various strategic points about the world, stations at which vessels may replenish their fuel supply. The completion of the Panama canal has made that waterway a center of a large part of the world's traffic and a most important link in our own. In its relation to the United States navy, it is the Kiel canal of America. As a fueling station for the battle fleet and for commercial vessels, the Panama canal zone is, therefore, of prime importance. To supply oil to the many vessels using this fuel, the government has had erected four large tanks at Mount Hope and Balboa, which have individual capacities of 44,000 barrels. They are 93 feet in diameter and stand 35 feet high.

These tanks, which were erected by the Petroleum Iron Works Co., Sharon, Pa., are first assembled on cribbing

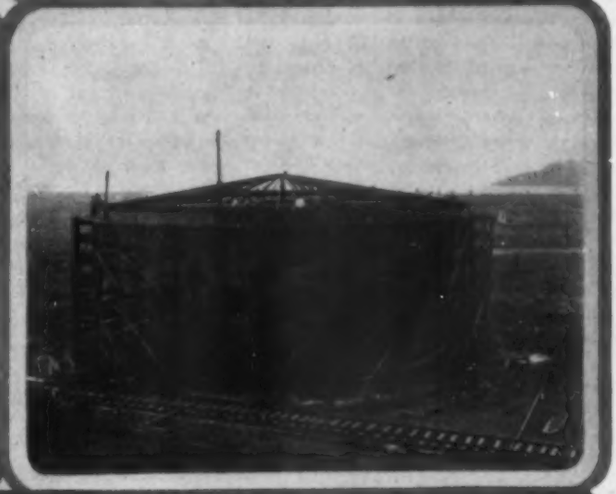






blocks or horses. After one ring has been added, the tank bottoms are tested. If the test proves satisfactory, the blocks are removed and the tank is lowered onto suitable sand or concrete foundations. The accompanying illustrations show the method of building one of these tanks. They indicate the various stages of erection, including the construction of the bottom and the addition of the first, second, third, sixth and seventh rings, finally completing the tank.

The illustration directly above this paragraph indicates how a gin pole, equipped with a plate buggy, is used to roll the plates around the tank to their proper place. This view also shows the character of scaffolding employed during the erection of the tanks. After the steel shell is completely assembled, the structural members for the roof are placed as shown in the illustration to the right. The immediate proximity of the tanks to the canal may be judged from the view of the practically completed tank at the bottom of the page.



Magnetic Study of Steel Products

The Definite Relation Existing Between the Magnetic Characteristics and the Physical Properties of Steel Permits of Satisfactory Analysis—The Possibility of Commercial Application is Indicated by Experiments

BY CHARLES W. BURROWS

THE science of magnetic analysis consists of the systematic correlation of the magnetic and other properties of materials and of the application of the laws and principles which underlie the interrelations of such properties, particularly the interrelations of the magnetic and mechanical properties of steel. It is based upon the fundamental fact of observation that there is one, and only one, set of mechanical characteristics corresponding to a given set of magnetic characteristics, and conversely there is one, and only one, set of magnetic characteristics corresponding to a given set of mechanical characteristics.

The art of magnetic analysis consists in the determination of the magnetic characteristics, or better, a small number of the magnetic characteristics, and from these observations making estimations of the mechanical properties.

Criteria of Mechanical Properties

The nature of a piece of steel may be studied by observing its behavior under the action of certain mechanical forces. The usual mechanical tests result in the destruction of the specimen so that it is not feasible to give such a test to the identical material to be used in a given structure. Even such superficial and intensely localized tests as the Brinell ball hardness test and the scleroscope test require the finishing of the surface tested, and after their application leave the surface in a modified condition.

Another very common way of examining steel is to determine its chemical constituents. The chemical analysis is extremely valuable and is usually considered as being the most valuable criterion of the mechanical possibilities of the steel. This test also must be made on a part of the material which does not enter into the final structure. The assumption must be made that the sample analyzed is substantially of the same composition as material to be used in the construction.

The chemical analysis, however, is entirely inadequate to tell what condition the steel may have been left in as a result of its previous thermal and mechanical treatment. It is well known that two pieces of steel of the same chemical composition may be given different heat treatments and finally have widely different mechanical properties. For instance, slow cooling from a high temperature may leave the steel so tough that it may be bent back on itself without breaking. On the other hand, extremely rapid cooling from the same temperature will leave the steel so brittle that it will snap in two when dropped upon the floor.

In order to determine whether the steel has had proper heat treatment for a given purpose it is customary to examine the structure of the steel under the microscope. The surface to be examined is carefully polished and etched by some suitable means. The different constituents as determined by the chemistry of the material and modified by its past mechanical and thermal history, are etched to different extents by the etching medium. The resulting etched surface when viewed under reflected light presents an appearance characteristic of the material under investigation. However, the microscopic analysis becomes difficult in the fine-grained steels. Here the structures of steels of slightly different heat treatment are so nearly alike that it is possible to make only a rough estimation of the heat treatment from the microscopic observations.

The mechanical, chemical and microscopic analyses of steel form the basis for the customary specifications and testing. They are, however, open to one or more of the following objections:

1.—The test is vicarious. The actual material which is to be used in practice is not itself tested. Usually a certain percentage of the gross amount of material is set aside for test and the remainder is used in construction. This assumes either that the material is all homogeneous or that if non-uniform the test sample is a true representative of the entire lot. It is only by extreme care that either of these assumptions is even approximately met.

2.—The test is destructive. In the tension test the specimen is usually broken. The chemical examination changes the nature of the material so that it no longer has the properties of the original. Hardness tests mar the surface to greater or less degree. This destructive nature of a test renders the piece tested unserviceable, no matter how excellent it might have been before the test.

3.—The test is local. Many tests do not determine the characteristics of the entire test specimen. A chemical analysis may be made upon a drilling, which constitutes only 1 per cent of the sample submitted for test, which sample itself might be considered as representative of one hundred times its own magnitude. A hardness test involves still less material and even this small amount lies within a short distance of the outer surface of the test specimen. The limit of minuteness, however, is attained by the microscope sample. The usual micrograph represents an area of less than 1 millimeter in diameter and is quite superficial.

4.—The test may be qualitative. Some of these tests are valuable only when compared with similar tests on other material which may be considered as reference material. This is true of certain color tests in chemical analysis. The meaning of many micrographs can be determined only by comparing them with photographs of other material of known composition and history.

There are other tests which are free from the above objectionable features. The thermal, electric, and magnetic properties, at least in certain cases, can be measured without altering the nature of the test specimen. If further, there is known the relation which exists between these properties and the corresponding mechanical properties, such tests would be of value in studying the general properties of steels.

The purpose of the present paper is to show how the magnetic examination of steel can be of use to both the producer and user of steel and steel products.

Determining Factors in the Mechanical Properties of Steel

It is well known that two pieces of steel which differ in any one of a number of particulars show correspondingly different mechanical properties. It is well supported by experimental evidence, but not so generally known, that two pieces of steel which differ in certain particulars, likewise show corresponding magnetic differences. It is not feasible to go into great detail on this point at this time. For the purposes of the present paper

A paper presented at the twentieth annual meeting of the American Society for Testing Materials, Atlantic City, N. J., June 26 to 29, 1917. The author, Charles W. Burrows, is associate physicist, United States bureau of standards.

it is sufficient to give a few rather well-known examples of this correlation.

The changes that are brought about by adding certain chemical constituents to steel are well known. In many cases the corresponding magnetic properties have been studied. With increasing carbon content in a hypoeutectoid steel there is an increase in hardness and tensile strength and a decrease in toughness. Magnetically an increase in carbon content is accompanied by an increase in coercive force and hysteresis, and a decrease in permeability. Many other cases might be cited.

Mechanical operations also bring about corresponding changes in both the mechanical and the magnetic properties of steel. The cold drawing of a carbon steel increases its tensile strength and simultaneously increases its coercive force and hysteresis. Cold drawing also decreases the magnetic permeability.

The influence of heat treatment upon the properties of steel is fairly well known. A 1 per cent carbon steel quenched in water from a temperature above its critical point has a greater tensile strength than the same material in the annealed condition. Its hardness is also increased while its toughness is greatly decreased. Magnetically, changes of equal magnitude also occur on quenching. The quenched steel has a greater coercive force, a greater hysteresis, and a lower permeability.

In a specific case a 1 per cent carbon steel in the quenched and the annealed conditions had brinell hardness numerals, in terms of kilograms per 0.1 millimeter indention of 4390 and 800, respectively. The corresponding values of the coercive forces for a magnetizing force of 150 gausses were 33 and 12.

Steel changes with lapse of time. The course of this change is not so well known as some of the above changes. However, both mechanical and magnetic changes occur. Glass-hard steel softens with age. The same steel shows a decrease in coercive force.

The mechanical properties of a bar of steel may differ from point to point if the bar has not received the same treatment throughout. For instance, if a uniform bar is given a slight bend and again straightened, it will show a slight change in its mechanical properties. There will be an increase in both hardness and tensile strength. The same bar will show a corresponding decrease in permeability in the same region.

Even during the operation of stressing a bar we feel sure that changes in the mechanical nature are occurring. Less is known about this phase of the problem than the preceding. However, we do know that small alternating stresses, even though well within the elastic limit, leave the material mechanically fatigued and if the stresses are repeated often enough, rupture occurs. While it is difficult to study the changes in mechanical properties after repeated or alternating stresses, the magnetic problem is quite simple and has been investigated to some extent.

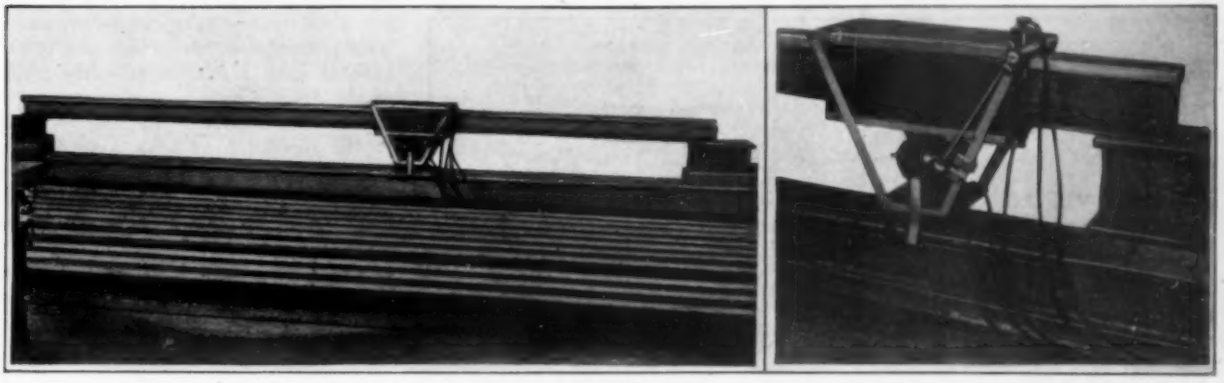


FIG. 1—MAGNETIC CIRCUIT OF RAIL UNDER EXAMINATION BY LEAKAGE TEST—FIG. 2—TRAVELING SOLENOID USED IN LEAKAGE TEST

Practical Applications of Magnetic Analysis

Magnetic analysis may be applied to determine the nature of the steel as a raw material, as a finished product, or even after it has been subjected to service conditions. It is obvious that one cannot get a good product from inferior materials. Consequently it is desirable to know the nature of the raw stock that enters into the construction of the finished product. In this classification of raw material and finished product, it must be recognized that what is raw material from one point of view is the finished product from another. The rod is a finished product as viewed from the standpoint of the rod mill. The manufacturer of ball bearings, however, looks upon the rod as a raw material.

Raw material must be uniform in quality. The proper mechanical and thermal treatment must be determined for each steel that is used. It very frequently happens that two steels of quite different composition may give equally good performance for a particular service provided each steel is given the appropriate heat treatment. In general, the heat treatments required for the two steels will be different. Consequently, if the heat treatment appropriate to the second steel is given to the first, disastrous results may be expected. It is desirable, therefore, that all the different bars of a given lot of material shall be of the same quality as the material for which the proper heat treatment was determined. Such assurance requires the examination of every individual bar of steel.

The requirement that all bars shall be alike in properties, implies that each bar shall have the proper composition, shall be properly forged, rolled or drawn, as the case may be, and shall be free from local imperfections such as blow-holes, segregation, etc.

Occasionally a lot of steel of the wrong composition is supplied through error; or, by some chance, a single bar of different composition may get mixed up with the general stock. If not detected, such a bar may cause much loss or annoyance. Very frequently a steel, especially among the alloy steels, may have the proper chemical composition, but with the elements not in the proper state of solution. It is not uncommon to find that a tool made from a large bar will prove defective while the same bar, when forged down to a smaller size, will yield perfect tools. Since the cost of labor frequently amounts to more than the cost of material, it is very desirable to be able to separate the good from the defective material before costly labor has been expended upon it all to no purpose.

Among other defects that sometimes are found in cold-drawn material is the tearing apart of some of the crystals beneath the outer surface. Many of these defects would pass unnoticed in the usual examinations by the chemist, microscopist, or mechanical tester. In such cases as the above, a magnetic examination may be expected to be of service.

Finished Steel Products

The ideal test of a finished product is one which permits of the examination of each individual specimen and does not assume that the characteristics of ninety-nine pieces are identical with those of the hundredth one which happened to be picked out for test. Magnetic analysis is adapted to such individual testing. The individual test not only permits of the elimination of defective pieces, but also permits of the grading of a product which, while satisfactory in general, is not all of the same degree of perfection. It is a matter of common experience that an occasional tool is found which is quite superior to the average fairly good tool. Any method which will enable one to select such exceptionally good tools cannot fail to be helpful. This process of grading will enable the manufacturer to offer a uniformity of product hitherto unknown and permit him to guarantee such uniformity with surety. It is true that certain tools will have to be sold as seconds at a reduced price. On the other hand, there will be a new class of exceptional quality which will bring a correspondingly higher price.

The individual test will permit improvement in design. At present we insist upon factors of safety so large that there would be a reasonable factor of safety even though there were a considerable amount of defective material. If a material is used whose individual properties are not known and which may vary between wide limits a greater factor of safety is used than if known material were used. For example, a cast iron structure might have a factor of safety of 10, while a similar structure of steel would be safe with a factor of four or five.

Frequently it is desirable to make exhaustive tests upon a few pieces. Such cases arise where one or more samples are submitted in competition with other material. I recently witnessed a test on the results of which an order of $200,000 was to be based. Five pieces, worth about $2 each, were submitted by each competitor. The properties of each sample depended upon proper composition and proper heat treatment. Even though the composition were correct, a slight error in the heat treatment would place the material at a disadvantage. By a suitable magnetic test the manufacturer could have assured himself that his samples were representative of his best product.

I have made laboratory tests on a number of commercial articles with considerable success. Experimental evidence already at hand shows that it is feasible to apply individual magnetic tests to many forms of tools, cutlery and springs. These tests are of such a nature that they may be carried out on a commercial scale. Rings and balls for ball bearings are now being tried out by this method with every promise of success. Steel rails, in spite of their size, lend themselves very readily to this method of examination.

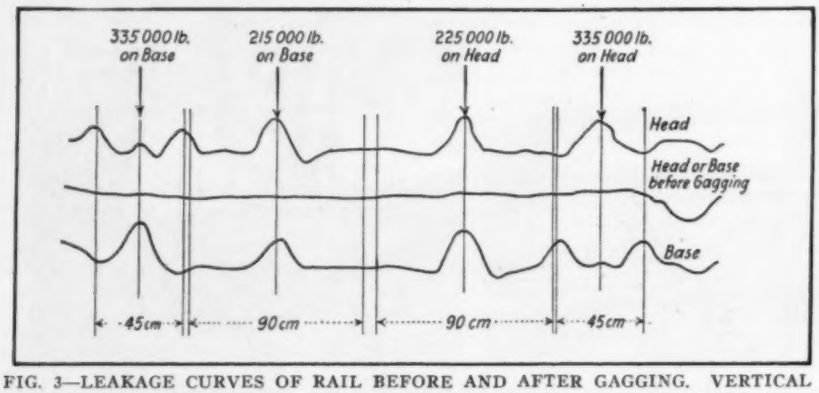


FIG. 3—LEAKAGE CURVES OF RAIL BEFORE AND AFTER GAGGING. VERTICAL ARROWS INDICATE POSITION OF APPLICATION OF GAG. HORIZONTAL ARROWS INDICATE DISTANCE BETWEEN SUPPORTS

Service Effects

Since the magnetic and mechanical properties of steel suffer changes with the lapse of time and under ordinary service conditions, the magnetic method offers a very promising means of examining, without destruction, the changes that develop during the life history of a structure. Some of the things to be looked for are the ordinary results of wear and tear. A good example of this is the mine or elevator cable. Such cables grow old and lose their usefulness or even become a source of danger due to the wearing away of the material, the breaking of strands, excessive strains, the development of a crystalline structure, etc. The causes of deterioration of a cable are so numerous and the possibility of disaster frequently so great that it is customary to replace an old cable by a new one when several years of usefulness still remain in the former. A proper magnetic test would keep the cable under surveillance at all times and would maintain an autographic record.

Make Operating Tests

A structure may fail by the development of flaws. For instance, a steel rail may render apparently satisfactory service for several years and finally develop a transverse fissure which results in a dangerous accident. Periodic examinations of rails which are under suspicion because of excessive duty or other causes, if made, would enable us to detect the presence of such a flaw in an early stage of its development.

Magnetic analysis may be of use in the development of a new design. It is customary when a new design or a new model is developed to run a service test and at intervals to dismantle the apparatus and go over in detail the various members of the structure. This procedure is common in high-grade mechanisms, such as automobiles, adding machines, etc. Such an examination will detect errors in design or faulty material which result in fracture or excessive wear. They do not, however, indicate the structure of a part which is just about to break. A magnetic test may be expected to follow the changes in structure from the initial perfect condition, through the various stages of fatigue, to the final rupture. Such changes would be indicated magnetically, whether they were due to a gradual return to a crystalline equilibrium or to stress effects.

Another field which has not as yet been tried, but for which the possibility has already been established is in the study of the state of stress of a given structural member. For instance, it may be desired to determine whether a given member in a bridge undergoes tension or compression during the passage of a train. The fact that steel suffers certain changes in its magnetic properties when put under tension and certain other changes when put under compression renders such a determination possible.

The apparatus required and the procedure of testing depends, to a great extent, upon the nature and size of the material tested as well as upon the characteristic flaws to be

expected. Apparatus for examining safety-razor blades is necessarily quite different, notably in size, from apparatus for the testing of steel rails. In the case of a lathe tool in which only the nose is hardened the examination differs from that of a locomotive driving rod which is more nearly uniform throughout.

If the testing of rails is to give a certainty of the quality of the material, it is necessary to test not only each rail, but every element of the length of each rail. This may be accomplished by a double magnetic test. One part of the magnetic test will determine whether there are non-uniformities along the length of the rail. Since this test is based upon a determination of magnetic leakage, it is referred to as the "leakage" test. The leakage test determines the homogeneity of the rail. Inhomogeneities, while they may not be due to dangerous imperfections, always cast suspicion upon the rail, and should not be used in places where the highest degree of perfection is required. For instance, they should not be used on bridges, in tunnels, or where the traffic is heavy. Homogeneity in itself is not evidence of perfection. A rail may be quite uniform along its length and yet be an unsafe rail. Its dangerous nature may be due to improper chemical composition or to errors in the process of manufacture such as improper finishing temperatures or excessive cooling rates. To determine whether or not such defects exist requires a determination of one or more magnetic constants. These measurements may be made in some form of permeameter and in conformity with the nomenclature for similar tests on small specimens, we call this part of the magnetic examination the "induction" test.

Self-Recording Apparatus

Figs. 1 and 2 show the general appearance of the leakage apparatus for rails. A magnetizing solenoid is moved along the length of the rail. Any non-uniformity along the rail will cause a variation in magnetic leakage. This variation in leakage develops a small electromotive force which is approximately proportional to the degree and sharpness of the non-uniformity. A special recording voltmeter, not shown on the photograph, makes a photographic record of the magnetic inhomogeneities. This examination of a rail can be made in about one minute and excessive demands for skill and training are not made upon the operator.

Fig. 3 shows a set of magnetic-leakage records of a 105-pound rail before and after gagging. This rail has the following chemical composition:

	Per cent
Carbon	0.68
Manganese	0.98
Phosphorus	0.025
Sulphur	0.031
Silicon	0.144

From the curves shown in Fig. 3, the following conclusions may be drawn:

1.—Before gagging, the rail shows a magnetic-leakage curve which is substantially a straight line.

2.—Pressure applied locally so as to deform the metal produces a magnetic inhomogeneity at the point where the pressure is applied. This is true whether the pressure is applied on the head or on the base.

3.—The extent of this local inhomogeneity depends upon the distance between supports. If the supports are far apart, the strain seems to extend over the entire cross-section and seems to be greater on the side of the rail opposite the point of application. If the supports are close together, the strains are localized on the side on which the pressure is applied.

4.—The strains set up by the supports depend upon the distance apart of the supports. If the supports are 90 centimeters apart the magnetic effect of the supports is insignificant. If they are only 45 centimeters apart this effect is considerable. In fact, the side of the rail on which the supports lie shows a magnetic inhomogeneity at each support which is greater than the corresponding inhomogeneity opposite the gag.

5.—Other observations on other rails show that the degree of magnetic inhomogeneity increases with the load applied by the gag.

6.—Furthermore, it is worthy of note that another rail from the same ingot which had been annealed showed a much less effect for the same gagging stress.

This ability of the magnetic leakage test to indicate the effect of gagging is of importance in view of the fact that many people consider that excessive gagging produces minute failures in the rail which are in effect potential transverse fissures.

The most useful magnetic quantity is probably the coercive force. For the purpose of illustration we may give the coercive forces of two lots of rails of substantially the same chemical composition, made at the same mill, and differing only in their method of cooling. Four rails rolled in winter were from the first ingot which passed through the mill in starting the round for that particular date. Consequently these rails were the first upon the hot bed which was initially cold. Two other rails of substantially the same chemical composition were selected from a full hot bed and from the middle of a round rolled when the atmospheric temperature was 70 degrees Fahr. The averages of the coercive forces for a magnetizing force of 145 gausses were 10.30 gausses for the winter rails and 8.91 gausses for the summer rails. This difference of 1.39 is probably due, in great part, to the difference in the rate of cooling of the two sets of rails.

Commercial Magnetic Analysis

The fundamental fact that there is a definite relation between the magnetic and mechanical properties of steel is so well established that the successful application of magnetic analysis to commercial testing is assured. In any particular case, the apparatus must be developed and operators trained. However, the difficulties presented are not excessive. Before shop methods of examination of any given product can be installed, a preliminary investigation must be carried out which involves five steps.

1.—Magnetic data of representative material must be determined. Good, bad and indifferent materials must be examined and the data thus obtained correlated so that one may know what magnetic characteristics go with each grade of material.

2.—From the mass of data thus obtained the most suitable magnetic criteria must be determined. In some cases any one of several magnetic constants may be equally satisfactory. In other cases only one specific constant may be used. Still others may require the combination of two or more magnetic constants.

3.—Suitable apparatus must be designed. After the proper criteria have been determined, the next step is to determine what type of apparatus is best suited for the particular material to be tested. Ballbearing rings will, for the most efficient operation, require a slightly different piece of apparatus from that required by twist drills.

4.—Limits of quality must be determined. Since the proper combination of speed, cost and accuracy may call for some slight deviation from the ideal theoretical considerations, the material to be tested must be examined by the final form of apparatus. From these data the final criteria of quality must be determined.

5.—The final step of this preliminary investigation is the reduction of all the operations to mere routine, so that shop determinations may be made by an observer who is not necessarily an investigator.

It is not feasible to make an estimate of the cost of the testing equipment. However, it would not be excessive. The rail-testing apparatus shown could be duplicated for about $1500. While this apparatus would undoubtedly require modification for shop practice, this amount may be considered an estimate of the cost.

Two iron ore washers are to be built in the Russellville mining district at a cost of about $150,000, by the Sheffield Coal & Iron Co., Sheffield, Ala. Construction work will commence soon. A washer at Littleville, to cost $50,000, is being built.

Heavy-Duty Drill Press

A DRILL press suitable for manufacturing operations where duplicate pieces in large quantities are to be machined has been developed by the Colburn Machine Tool Co., Franklin, Pa. The large range of feeds and speeds ordinarily provided on drill presses have been eliminated and in their stead have been substituted provisions for only a sufficient number of speeds and feeds to handle the work in hand. This arrangement reduces considerably the number of parts in motion and minimizes bearing and gear friction. While the design of this machine is unusually simple, the range of speeds and feeds, however, is made practically limitless by an arrangement of transposing gears by which any desired combination of speeds and feeds may easily be secured.

Two mechanical speed changes are provided, which, in conjunction with transposition gears, make it possible to obtain 40 different speeds from 74 to 508 revolutions per minute. The mechanical changes of speed are made through sliding gears located inside the column which is so constructed that it forms an oil-tight box so that the gears always operate in an oil bath. The detail at the bottom of the accompanying illustration shows the two gears which may be transposed to give either a slow or fast spindle speed. By means of other pairs of change gears, almost any combination of two speeds desired may be secured.

Changes in feed are secured through a similar arrangement of transposition gears which are located on the front of the machine and which are shown in the upper detail of the accompanying illustration. With a few sets of transposition gears, a wide range of feeds may be secured.

The press is driven through a constant-speed belt running on tight and loose pulleys on the main line shaft, thus eliminating countershafts. The machines are designed to operate 1¼-inch, high-speed drills in solid steel, through a spindle travel of 12 inches. The drills have a swing to the center of a 20-inch circle. Two, three and four gang drills are also manufactured by the Colburn company. Each head forms a complete unit which permits of the mounting of a number of heads on a common column.

DRILL PRESS DESIGNED FOR MACHINING LARGE QUANTITIES OF DUPLICATE PIECES

Motor Drive Hand Milling Machine

A novel application of the motor drive is one of the unusual features of a new hand milling machine recently developed by the Superior Machine & Engineering Co., Detroit. Fig. 1 is a section drawing of the speed gear box of the machine showing the sliding gear and transposing gears on the ends of the shafts for varying the spindle speeds. The lower pulley near the bottom of the column, the pulley on the end of the spindle, and the upper pulley on the swinging arm are interchangeable, and in combination with the two-speed gear box and transposing gear. Twelve spindle speeds are obtainable, varying from approximately 150 to 1035 revolutions per minute. The large sprocket wheel is keyed to the hollow main drive shaft. The quill gear is also keyed to this shaft and drives the sliding gear, on the shaft *A*. Gears *B* and *C* are transposing gears and either can be used on shaft *D*, which runs in bronze bearings in each end of the hollow shaft. The hollow shaft to which the large sprocket wheel is keyed and the pulley shaft *D* revolve in the same direction.

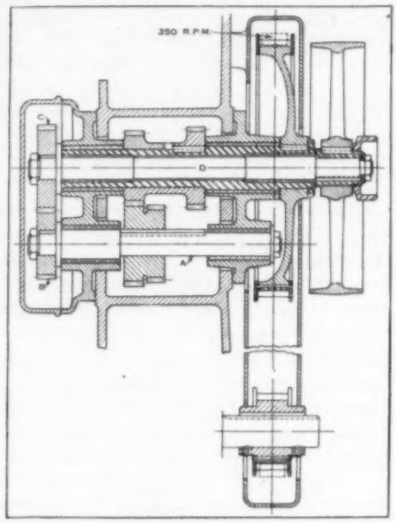


FIG .1—SECTION DRAWING OF SPEED GEAR BOX

The chains and sprocket wheels are entirely covered as shown in Fig. 2.

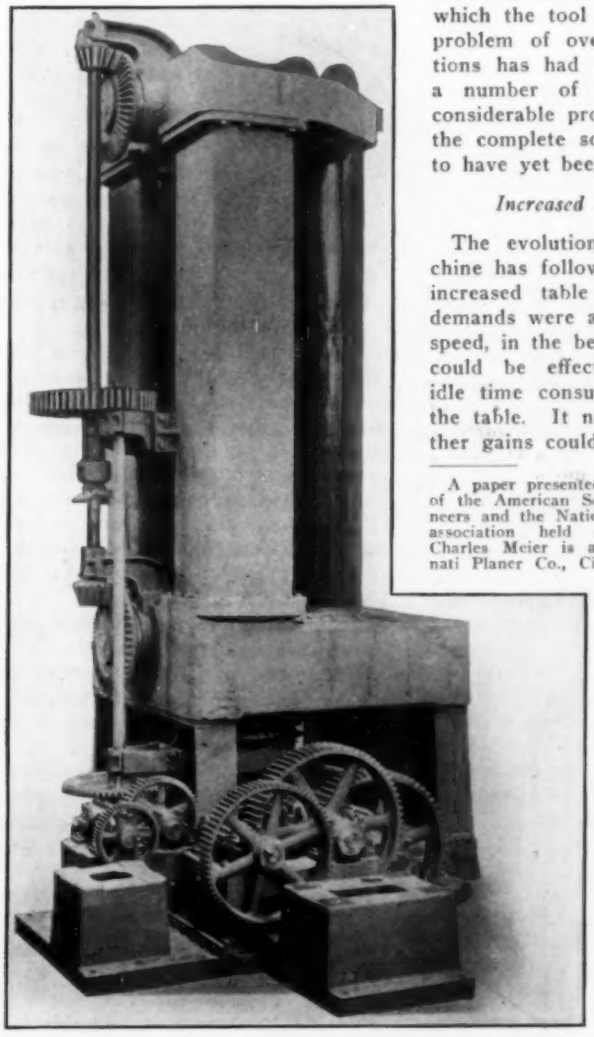
Vertical Plate Bending Roll

A late type of vertical plate bending roll for marine boilers recently developed by the Southwark Foundry & Machine Co. is shown in the accompanying illustration. The main or center roll is 30 inches in diameter and the two back rolls are 22 inches in diameter. The screw-down arrangement of the main roll is such that it can be disconnected allowing the main roll to be thrown out of parallel with the two back rolls. All three rolls are supported on a special type bearing, manufactured by the Standard Roller Bearing Co. The screw-down mechanism is operated by independent

motors from the main drive. The bull pinions are of high grade open-hearth steel castings. The driving mechanism is mounted beneath the floor line in a pit which is boarded over, this arrangement materially reducing the amount of floor space occupied by the machine. The bearings of the main roll are all lined with bronze alloy, making them renewable. The total weight of the machine is 210,000 pounds.

Lake Traffic is Heavy

Officials of the Cleveland & Buffalo Transit Co., operators of the SEEANDBEE, CITY OF BUFFALO and CITY OF ERIE, daily between Cleveland and Buffalo, predict that this season will surpass all others in volume of passenger and freight traffic. The unusually large traffic on the lake steamers, is attributed to the freight conjestion on the railroads of the country, which not only has delayed the shipment of freight, but has greatly interfered with the comfort of passenger travel.



VERTICAL PLATE BENDING ROLL FOR MARINE BOILERS

Aids to Planer Production

BY CHARLES MEIER

THE problem of providing the increased speeds and power to develop the possibilities of high-speed steel and to meet the increasing necessity for greater production has been a comparatively simple one in such machines as lathes, drilling machines, boring mills, milling machines in which the cutting is continuous and the motion of the tool is in one direction only. In this type of machine it has meant merely adding power and strengthening parts. The speeding-up process introduces, however, a vastly different problem in such machines as slotters, shapers and planers, in which the cutting is not continuous and which have a return motion of the tool. The principal limitations of machines of this class, especially the planer, are the inertia of the moving mass at the moment of reverse and the speed at which the tool enters the work. The problem of overcoming these limitations has had the attention of quite a number of engineers, and while considerable progress has been made, the complete solution does not seem to have yet been reached.

Increased Speed Demanded

The evolution of the planing machine has followed along the lines of increased table speeds. The earlier demands were all for a higher return speed, in the belief that great savings could be effected by reducing the idle time consumed in the return of the table. It next followed that further gains could be made by increasing the cutting speed, owing to the fact that this part of the cycle consumes the greater part of the time involved. The advent of high-speed steel can be credited largely with the marked advance in this part of the development.

After fairly high speeds in both directions were obtained there came the demand for variable cutting speeds. It soon became a recognized fact that to operate a planer having only one cutting speed was both wasteful and detrimental to the best methods of increased production. This constant change of conditions, and the desire to obtain the highest possible speeds in both directions, led to serious difficulties for which a change in design became imperative. One of the objections to the speeding-up of the planer was the difficulty encountered at the reverse, namely, the inertia of the moving parts. Several tests were conducted which established the fact that the greater part of the trouble was caused by heavy machine pulleys and their high speeds. Various types of magnetic, pneumatic and mechanically operated

A paper presented at the combined meeting of the American Society of Mechanical Engineers and the National Machine Tool Builders association held in Cincinnati, May 21. Charles Meier is associated with the Cincinnati Planer Co., Cincinnati.

FIG. 2—MOTOR-DRIVEN HAND MILLER SHOWING COVERED CHAIN AND SPROCKET WHEELS

Table I

Test on 30 x 30 x 14-Foot Planer Showing Efficiency of Driving Pulleys

Length of stroke, feet.	Time table was running, minutes.	Cutting strokes with C. I. pulleys, weight 56 pounds.	Cutting strokes with aluminum pulleys, weight 20 pounds.	Number of strokes gained	Theoretical number of strokes.	Per cent efficiency of aluminum pulleys.
2	30	306	350	44	415	84.3
4	30	165	189	24	207	91.3
10	30	76	82	6	83	98.7

clutch drivers were designed in which the pulleys were not reversed. These drives developed the objectionable features inherent to friction clutches, namely, the slippage and wear which take place before the parts are properly engaged. The most successful of these types was the pneumatic clutch. A step which marked quite an advance was the use of an aluminum alloy for the pulleys instead of cast iron. It was found that not only did this overcome the greater part of the objections to the heavier pulleys, but that higher speeds were possible so that a decided gain was made in the number of cutting strokes owing to the fact that less time was consumed in the reverse. Table I gives results of a test made on a 30 x 30 x 14-foot planer. These pulleys were also found to effect quite a saving in power. Table II shows a test made on a 76 x 62 x 32-foot planer, in which the saving in power was about 25 per cent.

Table II

Test of 76 x 62 x 32-Foot Planer With Cast Iron and Aluminum Pulleys

Amperes gear box and loose pulley.	Amp. platen in direction of cut. C. I. pulley.	Amp. platen in direction of cut. Alum. pulley.	Amp. platen in direction of return. C. I. pulley.	Amp. platen in direction of return. Alum. pulley.	Amp. reverse from cut to return. C. I. pulley.	Amp. reverse from cut to return. Alum. pulley.	Amp. reverse from return to cut. C. I. pulley.	Amp. reverse from return to cut. Alum. pulley.	Length of stroke ft.	Remarks.
15	20	20	27½	28¾	132½	106¼	91¼	75	0.66	Lengthening stroke from 0.66 ft. to 20 ft. does not alter result 2 amp. either way.
14	22½	20	30	28¾	132½	105	93¾	76¼	20	
16	21½	21¼	30	30	130	105	95	76¼	20	
15	21½	20.4	30	29⅛	132½	105	93½	76¼		This line is average.
4.4	6.3	6	8.8	8.6	39	30.9	27½	22.4		Average Hp.

The subject of individual electric motor drive for planers has received considerable attention in the past few years. One type of drive which has been successfully developed is the variable-speed drive. This consists of a 2 to 1 variable-speed motor coupled direct to the top driving shaft of the planer. The speed of this motor is controlled by two separate sets of resistances which are automatically operated by a master switch connected to the shifting mechanism of the planer. The cutting speed can be varied from 25 to 60 feet per minute, while the return speed may be varied if desired without affecting the cut. The controller handles are set to a predetermined speed before starting. The planer is operated in the usual manner from the tumbler, and the master switch automatically varies the speed of the motor at each reversal. This type of drive has the desirable feature of eliminating mechanically-operated speed variators.

Probably the most interesting motor application to planers in recent years is the reversible-motor drive. While it cannot be claimed that the application of this type of drive is new, it can be stated that the drive approaches more nearly the ideal planer drive than any other method heretofore used. By coupling the motor direct to the first driving shaft, the entire reversing mechanism, pulleys and belts, are eliminated and all the objections before enumerated are successfully overcome. The motor is an adjustable-speed motor, having a speed range of 1 to 4 so that a large range of cutting speeds from 25 to 50 feet per minute can be obtained. A double set of resistances is provided, making it possible to vary either cutting or return speed independently of the other. This arrangement has also simplified the problem of variable speeds in connection with this drive.

The operating mechanism is handled in exactly the same manner as is the standard belt-shifting type planer, so that no complications are encountered by the operator. Two predominating features in this type of drive are the total absence of belt slippage under heavy cutting and the lower peak loads at the moment of reverse. Table III shows the advantages of these two features. It can be said that the reversible motor drive as applied today furnishes about all that can be desired of an efficient planer drive. The study of fatigue of the operator and easy control of the machine is receiving quite a lot of attention in almost every machine operation, and there is no doubt but that great possibilities in this direction exist in machine-tool construction.

Power operation of heavy machine parts seems to have found a permanent place in the construction of all classes of machinery. There is an increasing demand for elimination of lost time between cuts, and this feature has also found its way into the design of planers.

Table III

Test Made by General Electric Co. on 60-Inch x 72-Inch Planer

	Single belt drive.	Double belt drive.	Pneumatic clutch running at 200 revolutions per minute on cut and 600 revolutions per minute on return.	Pneumatic clutch running at 70 revolutions per minute on cut and 200 revolutions per minute on return.	Direct-connected electric motor having cutting-speed range of more than 2 to 1 and total speed range of 4 to 1.
Drive, horsepower	25	25	25	25	25
Stroke, feet	8	8	8	8	8
Approximate cutting load, horsepower	25	25	24	26	31
Peak load, reverse to return, horsepower	55.5	44.3	75	25	20
Peak load, reverse to cut, horsepower	25	55	36	15	20
Time return stroke, seconds	7.2	7.2	7.6	6.8	5.6
Time cut stroke, seconds	20	20	19.5	16	13.4
Time of cycle, seconds	27.2	27.2	27.1	22.8	19
Feet per minute return stroke	66.6	66.6	63.2	70.5	85.7
Feet per minute cut stroke	24	24	24.6	30	25.8
Ratio cut to return, one to	2.78	2.78	2.57	2.35	2.4

Science of Industry is Advanced

Anniversary of American Society of Testing Materials Marked With Most Notable Meeting in History—Magnetic Testing Crowns New Contribution—Steel Specifications Revised—Propose Standards For Soil Pipe—Tests For Refractories

WITH stimulated activity, rousing enthusiasm, unabated interest and the largest attendance in history, the American Society for Testing Materials celebrated its fifteenth anniversary last week with a four-day meeting at the Hotel Traymore, Atlantic City. In many respects this gathering was epoch-making, not only in the annals of the organization, but in its contributions to industrial science and testing engineering. The program was one of the largest in the history of the Society with thirty committee reports and an equal number of papers which covered 1078 printed pages. The far-reaching influence of its work was reflected by the first report of the committee on refractories, which presented tests for refractory materials under load at high temperatures; for the slagging action of refractory materials and methods for the ultimate chemical analyses of refractory materials.

The new tentative standard for cast iron soil pipe and fittings marks the first attempt at the introduction of specifications for this class of materials and the standard for railroad malleable iron castings which provides for a tensile strength of 45,000 pounds per square inch and an elongation in 2 inches of 7.5 per cent, was prompted by the improved practice of American malleable foundries. The science of testing also is reaching out into the brass foundry, as evidenced by the tentative standard for nonferrous alloys for railway equipment in ingots, castings and finished car and tender bearings. The magnification scales for micrographs will be hailed by scientific men as a step in the right direction and will permit of comparisons of the results of investigations of metallography more readily than is possible today. The report of the committee on steel provided for nine revisions in existing standards; two revisions in tentative standards, and a proposed specification for carbon tool steel, thereby invading a new field that has proven difficult to standardize.

No meeting of the Society would be complete, nor would it be considered a success, without some outstanding contribution to science. This year's gathering was featured by a report on magnetic testing, by C. W. Burrows, which was developed at the United States Bureau of Standards, Washington, D. C. This method of testing neither destroys nor defaces the material and permits of testing every piece, in place of one of a lot, being particularly adapted to the testing of rails, either in service or at the mill.

The twentieth annual meeting of the Society and its fifteenth anniversary, was celebrated on Wednesday evening, when the president, A. A. Stevenson, delivered his address. For five years the organization was affiliated with the International Association for Testing Materials, but 15 years ago the ties were severed and the American Society was formed. In hazarding an opinion on the future, Mr. Stevenson said that he looks forward to the time when there will be one general engineering society, made up of the various technical organizations as members, and at present a committee of the leading engineering association is trying to evolve some plan of closer co-operation, whereby standards may be made national in application. All of the living past presidents of the Society took part in the celebration and delivered brief addresses. These five former chief executives included Captain Robert W. Hunt, Henry M. Howe, A. N. Talbot, Mansfield Merriman and A. W. Gibbs. Brigadier-General W. H. Bixby, president-elect, has been called into active service and was unable to attend, while Edgar Marburg, secretary-treasurer, was compelled to absent himself from the meetings of the society, owing to ill health.

Various Steel Specifications Are Revised

REVISIONS in nine standard specifications and in two tentative standards were made upon the recommendation of the committee on steel, of which C. D. Young is chairman. Only one new specification, namely for carbon tool steel was presented, and this will be published for one year among the tentative specifications. The specifications for steel track spikes; steel screw spikes; carbon steel bars for railway springs with special silicon requirements, and for elliptical springs for automobiles, were continued as tentative for one year. Revisions were made in the following existing standards: For blooms, billets and slabs for carbon steel forgings; for carbon steel and alloy steel forgings; for quenched and tempered carbon steel axles, shafts, etc.; for quenched and tempered alloy steel axles, shafts, etc.; for lap-welded and seamless steel boiler tubes, etc., for locomotives; for lap-welded and seamless steel and wrought iron boiler tubes for stationary service; for welded steel and wrought iron pipe; for automobile carbon and alloy steels and for boiler and firebox steel for locomotives. Revisions in the tentative standards for steel tie plates and for boiler and firebox steel for stationary service, also were made.

Objection to Tie Plate Revision

Captain William R. Hunt objected to the revised tentative specifications for steel tie plates, although they were favorably passed upon by the other members of the committee. He said that the standard in its present form is impractical, that it is not being followed by the leading steel manufacturers and in the inspection of thousands of tons of tie plates by his company, the specification is not even considered. He suggested the elimination of the tentative standard until a more satisfactory report could be presented by the committee. It was pointed out by other manufacturers that the specification involves more testing than is desired by the user and that it is an impossibility to make tests as frequently as called for. J. P. Snow was of the opinion that the clause in the standard providing for the purchase of the material to chemical composition only, if desired by the purchaser, relieves the situation. J. J. Shuman, of the Jones & Laughlin Steel Co., Pittsburgh, said that while the re-

vised specification is not entirely satisfactory, nevertheless it is a document that may be criticized and the only way to get criticism is by publishing the standard so that ultimately it will be in workable form and acceptable to both producers and consumers. Although there was some opposition to the adoption of the revised tentative standard, it was accepted by a large majority.

In the tentative standard for steel tie plates, the use of bessemer steel now is permitted. The upper limit for tensile strength on metal over 5/8 inch in thickness has been omitted. A sliding scale for percentage of elongation has been adopted for both the 2 and 8-inch specimens, with the minimum value specified in each case; the bend test has been omitted and a requirement for reduction of area has been substituted. If the design of tie plate does not permit of proper physical tests, provision has been made for purchasing under chemical composition only. The permissible variation in sheared length of plates, with shoulders parallel to the direction of rolling, has been changed from 1/8 to 3/8 inch. For plates with shoulders perpendicular to the direction of rolling, permissible variations in the distance from the face of the shoulder to the outside and inside end of the plate have been added.

The committee presented a comprehensive report on the rail situation and it pointed out that interesting investigations of rail failures and causes producing the failures are contained in the publications of the interstate commerce commission and the American Railway Engineering Association. The report by Dr. P. H. Dudley on "Induced Interior Transverse Fissures in Heads of Two Types", made to the American Railway Engineering Association, also was referred to and it was pointed out that the railway committee of this organization finally has adopted standard specifications for rails weighing over 100 pounds per yard.

No Steel Tie Standard Reported

Last year the committee on steel reported that it would consider the preparation of specifications for steel ties, but this has been deferred for one year in the hope that by that time more information on this subject will be available. It also was reported last year that the consideration of special requirements for permissible variations in weight and thickness of sheared plates for ship use would be considered, but it is deemed desirable, however, to permit shipbuilders to become familiar with the permissible variations proposed last year, before proceeding with the preparation of special requirements for ship use.

Two questions relating to steel reinforcement bars were referred to the committee for decision last year. The first referred to the use of electric steel in place of open-hearth steel billets and the committee ruled that electric steel billets should be acceptable under these specifications. Furthermore, it is the sentiment of the committee that electric steel always may be sold acceptably in place of open-hearth steel, whenever the latter is specified in the specifications of the society.

The second question related to the acceptability, under the specifications referred to, of reinforcement bars manufactured from discarded steel axles. The committee ruled that such bars should not be considered as meeting the requirements of these specifications, since they prescribe test by heat-lot, which is claimed to be impracticable in the case of discarded steel axles.

Semifinished Specifications Changed

The changes made in the specifications for blooms, billets and slabs, for carbon steel forgings, have for their object, first, to include requirements for blooms, billets and slabs for alloy steel forgings, and second, a revision of the requirements for carbon and manganese for billets for carbon steel forgings. In the specifications for carbon steel and alloy steel forgings, the footnote under Section 7(z) of these specifications was eliminated, as well as of the standard specifications for quenched and tempered alloy steel axles, shafts and other forgings for locomotives or cars in which no typical chemical compositions for alloy steel castings are given in class as K, L and M. In reporting this revision, the committee stated that it is undesirable at the present time to correlate the chemical and physical properties of these forgings since the recommended chemical compositions for blooms, billets and slabs for the alloy steel forgings, referred to, will meet the requirements.

In the specifications for quenched and tempered, carbon steel axles, shafts, etc., for locomotives and cars, and in the specifications for quenched and tempered alloy steel axles, shafts, etc., for locomotives and cars, provision was made for an impact test for all forgings, unless otherwise specified by the purchaser, details of this test to be subject to agreement between the manufacturer and purchaser. On the question of drop test requirements for carbon steel car and tender axles, the committee reported progress, since tests on 6 x 11-inch axles now are being made.

During the past year two questions relating to forgings were referred to the committee for decision. The first involved the elimination of chemical requirements from specifications for axles in which the drop test is specified. The committee ruled that the time has not yet arrived when the physical properties disclosed by the drop test can be used to give definite information as to the serviceability of the axle without knowing the chemical composition of the steel.

The committee also was asked for an opinion regarding the annealing of bored forgings before or after boring. The opinion was expressed that the question of annealing before or after boring-out, does not properly concern the specifications of the society and if either is considered necessary in special cases, it should be subject to special agreement between the manufacturer and purchaser.

During the past year the only question placed before the committee on steel castings was with reference to the desirability of preparing specifications for alloy steel castings, and it was decided that it is undesirable at present to prepare such a standard.

In the specifications for lap-welded and seamless steel boiler tubes for locomotives, the revision in the flange test was designed to express the size of the flange as a percentage of the outside diameter of the tube, with a maximum limit instead of a fixed dimension of sizes between certain limits. The change in the requirements for the flattening test will bring this test into agreement with that of the American Society of Mechanical Engineers, the Master Mechanics' association and the Master Car Builders' association. The adoption of the Birmingham wire gage as standard, as proposed, changing the decimal gage to conform, involves only slight changes in the table of standard weights.

Tube Standard Changed

Numerous changes were made in the specifications for lap-welded and seamless steel and wrought iron boiler tubes for stationary service. These include the extension of the specifications for all of the tubes, flues, superheater pipes, arch tubes, etc., used in stationary boilers; the harmonizing of the requirements for the flattening and flange tests with specifications for tubes for locomotives; a formula for determining the test pressure when the pressure specified gives a fiber stress greater than 16,000 pounds per square inch; a table of standard weights for tubes, similar to that included in the specifications for tubes for locomotives and a table for thickness for various sizes and pressures which agrees with the table formulated by the boiler code committee of the American Society of Mechanical Engineers.

Revisions in the flattening test for steel pipe in the specifications for welded steel and wrought iron pipe, were made with a view of harmonizing the requirements of the Society's standard with those of the Master Mechanics' and Master Car Builders' associations.

Although this proposed new test has not been formally adopted by these organizations, it was acceptable to their representatives at a joint meeting with the sub-committee of the committee on steel.

The revisions in the standard specifications for automobile carbon and alloy steels, are designed to harmonize the chemical requirements for screw stock with the requirements in the standard specifications for cold-drawn bessemer and open-hearth steel automatic screw stock. The committee has advised the Society of Automobile Engineers that it will recommend this revision for adoption next year and has requested this organization to consider the specifitions as to requirements for screw stock, so that the specifications of the two organizations may still agree.

The only recommendation made by the committee with reference to boiler steels was to eliminate the requirement for copper in firebox steel for both locomotive and stationary service.

Last year a progress report was presented on investigations of test ingots for ladle analysis covering both chemical and microscopic requirements. The committee reported that these tests have been continued during the past year.

Order of Reporting Physical Properties

In its report last year, the committee stated that the order of reporting the various physical properties of steel would be considered during the coming year and it recommended that this order shall be followed: Elastic limit, proportional limit and yield point; tensile strength; percentage of elongation and reduction of area. No change, however, shall be made in the order in which references to these properties occur in the society's standards. The committee is of the opinion that there is not sufficient need at present to justify the considerations of specifications for cold-drawn or cold-rolled steel shafting.

Last year the committee reported the following order of presenting the chemical composition of steel: Carbon, manganese, phosphorus, sulphur, silicon, copper, nickel and chromium. It was recommended further that the percentage of carbon, manganese and silicon be reported to two decimal places, and percentages of phosphorus and sulphur, to three decimal places. The Association of American Steel Manufacturers has approved this order in reporting the chemical composition, but has taken no final action on the recommendation relative to the number of decimal places to which certain elements should be reported.

Objection was made to the proposed tentative specifications for carbon tool steel for the reason that the crucible process by which the steel shall be made, in addition to the electric, was not clearly defined. It was stated that tool steel is manufactured by the muck bar and steel melting bar crucible processes, and since the proposed standard contains no reference to these two methods, the chemical analyses alone are insufficient protection to the consumer in assuring his purchase of the muck bar grade if he desires to pay the higher price for this material. Also, it was stated, that the standard, as proposed, places the maker of muck bar tool steel at a disadvantage since the steel melting bar grade can be sold at a much lower price. It was pointed out that the two grades might be differentiated by the amount of contained oxides, but no method has been developed for doing this quantitatively, although it is accomplished by the use of the microscope. Furthermore, it was suggested that the specification contains reference to subsequent heat-treating properties. However, the recommendation that the proposed standard be referred back to the committee was defeated and it will be published as standard. This marks the first attempt at devising a specification for tool steel, and while its application is admitted to be far in the future, nevertheless it is generally admitted to be an advance step in the right direction.

The tentative specifications for carbon tool steel provide that the steel shall be made by the crucible or electric process with the exception of grade C, which may be made by the open-hearth process. For grades A, B and C, the carbon content is divided into 10 classes, namely, from 0.45 to 0.60 per cent for class No. 1, to 1.80 to 1.95 per cent for class No. 10. The maximum percentage of manganese for grade A is 0.40; for grade B, 0.45, and for grade C, 1.60. The phosphorus maximum percentage for grade A is 0.02; for grade B, 0.025, and for grade C, 0.035. The sulphur maximum percentage for grade A is 0.02; for grade B, 0.035, and for grade C, 0.04. The silicon maximum for grades A and B is 0.35 per cent and for grade C, 0.25 per cent.

Annealing Large Forgings

In reply to an inquiry relative to the best recommended practice for annealing large, bored forgings, the committee on the heat treatment of iron and steel recommended the following:

The stage at which a preliminary annealing occurs, is a matter of convenience to be decided by the buyer and seller. But the final or finishing boring should follow the final heat treatment, whatever that may be, whether it is an annealing or other form. In the case of large forgings, which are to be forged solid, bored and quenched and annealed, they should be rough-bored before quenching.

However, this report was not considered satisfactory and it was referred back to the committee for further consideration.

Magnetic Test of Steel

TESTING steel by magnetic analysis, described by Charles W. Burrows, of the United States bureau of standards, was generally considered as marking a new epoch in the testing of ferrous materials, since it does not involve the destruction of the object tested and it makes it possible to test each piece rapidly, in place of depending upon the results of the test of one piece as representative of a lot of 100. Elsewhere in this issue the method developed by Mr. Burrows is published and its application to rail testing is described.

In the discussion of magnetic testing, J. S. Unger of the Carnegie Steel Co., admitted that the test does not destroy or deface the material, and to a certain extent it permits of testing each piece, if of some length, such as a rail or a drill. Short, heavy objects, such as castings, are difficult, if not impossible to test. "The apparent advantage of testing every rail is not new," said Mr. Unger, "as every rail always has been tested automatically during the process of straightening. Magnetic testing will show a pipe of considerable extent. As there are almost diametrically opposite opinions among railroad authorities as to whether a pipe is injurious in a rail, must this not be settled first?

"The effects of cold-rolling or drawing, torn surfaces or interior defects produced by cold work may be shown. A rail in service is cold-rolled on the head, which is an essential part of the service it performs. A locomotve standing on a track will stress the rail under each wheel. Such stresses may be shown magnetically.

"It is claimed that a rail may be magnetically homogeneous, but unfit for service due to improper chemical composition, finishing temperature or excessive cooling rates. If rail finishing temperatures considerably above and below the limits prevailing at different mills affect the quality, why does not the actual experimental evidence from the

track prove it? Winter and summer rails are shown with different magnetic properties attributed to different rates of cooling. The inference is that the more rapidly cooled rails are inferior.

"If this be true, why are some of the railroads considering plant installations to heat and artificially cool rails more rapidly and how can we explain a difference of 50 per cent less wear in oil-quenched rails after five years of service, when compared with a similar number of untreated rails under exactly the same conditions of service, no failures occurring in either?

"If a gagged rail shows magnetic disturbance where gagged and an annealed rail a lesser effect, should rails not be ordered annealed, or what accomplishes the same purpose, of a softer variety chemically? If this is done will not the rails require more renewals on account of wear?"

Referring to gagging, Mr. Unger stated that no comparative track evidence ever has been presented to prove that it is injurious. In conclusion, he said that in the last three years at least five methods have been suggested for testing rails and he inquired whether there is not a greater need for the correlation of the present tests with the data from actual service, than for any new method of testing.

Howe Considers It an Advance Step

Dr. Henry M. Howe considered the Burrows magnetic test an advance step of far-reaching importance particularly due to the fact that the material to be tested is neither destroyed nor defaced. The present processes of testing, which involve the destruction of the piece, he considered crude, while he did not believe that the magnetic test would be accorded widespread, immediate application, he was of the opinion that it marks the beginning or radically different methods of testing which will not injure the specimen tested.

In his reply to the discussion, Mr. Burrows said that it is feasible to make magnetic tests of rails in track since it is not necessary to encircle the rail with the testing apparatus. At the bureau of standards the problem has been studied for a period of eight years and it has been established finally that the magnetic test can be applied satisfactorily in the examination of steel products, whether in service or at the mill.

The role of the several alloying elements in the alloy steels was considered by elements, by the following: Manganese, Henry M. Howe; nickel, by R. R. Abbott; silicon, by W. E. Ruder; vanadium, by G. L. Norris, and chrome-vanadium, by F. J. Griffiths. This discussion, in which great interest was manifested, was published in part in the last issue of THE IRON TRADE REVIEW. A statement made by Mr. Norris to the effect that nickel-chrome-vanadium steel is used extensively in light armor such as deck plate, gun shields and armor-piercing projectiles was questioned by one of the members who said that vanadium is not being used in the production of projectiles for our government, nor for deck plate or other similar purposes. In reply Mr. Norris said that he was unable, for obvious reasons, to state how extensively vanadium is being used for these purposes in this country, and added that nickel-chrome-vanadium armor plate is being made in Italy, England and France and that this alloy steel is being used for helmets, bullet-proof shields and that many projectiles are being made of steel containing vanadium.

Revision of Pipe Threads

THAT the form of the United States standard thread is better than the Briggs standard, was the consensus of opinion of the committee on revision of pipe threads. It was recommended that it would be advisable to replace the Briggs thread with the United States standard by gradual changes over a period of years and that a system of tolerances and gages be developed providing for changes every few years. In arriving at this conclusion the committee was guided by service rather than the series of laboratory tests which included comparisons of the resistance to leakage under air and hydraulic pressures. Drop tests were made to compare the resistance of the two types to impact and shock using threaded specimens. Tensile tests were made to determine resistance to stripping the two types. Bend tests were made to compare the strength of a threaded section of pipe and to study the effects of the modifications. These tests resulted in establishing the following facts:

The proposed thread showed a little better results under both the air and hydraulic tests.

In the tensile and drop tests the proposed thread showed about one-third of the breakages as the existing standard.

The bend test was not very satisfactory.

From the foregoing results the conclusion is drawn that in the case of smaller size pipes up to 1 inch, there is little difference in the strength of the connection to resist service conditions, but for the larger sizes of pipe the additional metal at the root of the proposed thread increases the ability of the pipe to resist bending or shock stresses.

In addition to the first series of laboratory tests a second series of tests have been conducted to confirm the previous tests. These tests, however, were made with samples made up by using carefully selected pipe fittings that had been inspected and gaged to insure as nearly as possible uniform test conditions. The summary of the results of these laboratory tests indicate that under air pressure the proposed thread on both the stock and the inspected fittings showed a little better results than the standard thread, while under hydraulic pressure the standard threads show up a little better. In either case the laboratory results show a difference that is not very great, and the two types of thread may be regarded as practically equal in respect to the kind and length of service which may be expected.

Results of Road Tests

These laboratory results, however, are not confirmed by the results of a road test conducted on 24 locomotives. Inasmuch as on these road tests, the proposed threads showed about 28 per cent more leaks per locomotive month than the standard thread; in the drop test and tensile test the pipe for the proposed threads showed 44 per cent as many failures as the standard thread, which indicated that the strength of the pipe to resist bending and vibration will be increased by using this proposed thread, which provides additional metal at the root. The road service tests were conducted with 12 locomotives fitted with the standard thread and 12 locomotives with the proposed thread. The pipe sizes used were from ⅜ to 1½-inch. All connections were made with the application of approximately the same force in all cases. Weekly inspections were made to observe leaks. Records were kept of leaks, also of all renewals of pipes and fittings for any cause. A number of leaks observed in the couplings of the proposed thread indicate that these connections were not tightened with sufficient force and also that extra force is necessary to crush the top of the thread in the fittings in order to allow the slopes of the threads to come in contact and form a tight joint. After this

trial, additional engines were placed in service with fittings carefully inspected and gaged to insure uniform conditions. The results of these service tests indicate that about 28 per cent more leaks per locomotive month were observed with the proposed thread than with the standard thread. On the other hand the pipe of the proposed thread had had about 69 per cent as many renewed pipes as pipes with standard thread.

Testing Galvanized Coatings

THE relative merits of methods for determining the weight of coating on galvanized materials were investigated by the committee on Preservative Metallic Coatings for Metals. The methods in current commercial use for determining the amount of zinc coating on galvanized materials follow: Preece test, involving immersion in neutral copper-sulphate solution; basic-lead-acetate method and stripping in concentrated hydrochloric acid containing antimony chloride. As the committee already expressed an opinion condemning the copper-sulphate method, no further work was done along this line. The investigation made was limited to a study of the latter two processes as applied to sheets and wires prepared by hot-dipping. A list of questions was submitted to 75 parties concerning the testing and sampling of metallic coatings for metals, which included manufacturers, consumers and testing laboratories. The following facts gleaned from these replies may be summarized as follows:

The Preece test is still in prevalent use in spite of its general condemnation; it is recommended for inspection purposes, on account of its ease of manipulation, no necessity for use of a balance, and consistent results "if properly carried out." This test appears to be used entirely for the inspection of wire. Many of the replies stated that the thickness of coating for such materials is expressed as the number of immersions required by the Preece test for stripping off the coating.

There is a considerable diversity of physical tests, the tendency being that only in case the sheet material is to be fabricated, should physical tests be specified and that such tests should bear some relation to the use to which that particular gage is to be put.

No uniformity whatever in the method of sampling sheet material prevails. Wires are universally sampled at the end of the reel or coil.

The thickness of coating on sheets is generally expressed in ounces per square foot; that is, 1 square foot includes both surfaces of the sheet.

The thickness of wires (by users and inspectors in general) is generally expressed in terms of the number of immersions in the Preece test. Other methods used (or suggested) are ounces per ton, ounces per unit area, and ounces per unit length.

The basic-lead-acetate method consists in the immersions of the sample which has been previously cleaned, dried and weighed in a solution of lead acetate of known concentration; the zinc passes into solution and a layer of spongy lead which can be easily removed from the surface of the sample, replaces it. A series of several 4-minute immersions with alternate scrubbing to remove the lead is practically always necessary. The difference in weight between the original, or coated, sample and the same after stripping represents the weight of zinc coating.

The hydrochloric acid-antimony-chloride method consists of immersions of the samples tested in concentrated hydrochloric acid to which has been added a small amount of a solution of antimony chloride. Immersions of 1 minute duration are considered ample. The samples are cut to size so that the loss of weight in grams is numerically equal to the weight of coating in ounces per square foot. Wires of No. 9 gage, the size used, should be cut in lengths of 10⅛ inches.

As a result of its investigations, the committee recommended both the basic-lead-acetate and the hydrochloric acid-antimony-chloride methods for determining the total coating of hot-dipped galvanized materials; the slight tendency of the second method to "run high" should be borne in mind, however. For determining the small local spots of minimum thickness, the first method should be used.

Three samples from each sheet should be tested, one from each position-edge, center, edge. Such samples should be 2¼ inches square, accurate to 1/64 inch, if it is desired to have loss of weight in grams per sample numerically equal to the weight in ounces per square foot of sheeting, that is, 2 square feet of coating. Wires may be sampled from either end of the reel and should be cut accurately to length, while tightly clamped in a suitable press, within 1/64 inch. Though no work was done upon pipes, it is recommended that such material be sampled at each end, a 2-inch length being used. For sheets, it is recommended that results are preferably expressed in units of weight per square foot of *actual* surface, that is, 1 square foot of sheet galvanized on both sides should be calculated as 2 square feet of area and not 1 square foot, as at present. For wires, the results should be expressed in units of weight of coating per unit area of surface, and also per unit of length. For coating on pipes, the coating should be expressed in units of weight of coating per unit of actual surface.

As yet no permissible variation or rejection limit is to be recommended for sheets. In fixing any such limit two sources of error should always be considered:

(*a*) The accuracy of the method of testing, which is limited by differences due to variations in sampling, variations in the thickness of the coating across the sheet, errors due to personal equation, etc., amounts to from 6 to 8 per cent of the actual amount of zinc as determined by weighing individual sheets before and after coatings.

(*b*) The unavoidable variations in mill practice give rise to variations in the weight of coating of different sheets, presumably of the same weight of coating, of a magnitude equal at least to that of the accuracy of the method used in testing.

Tests of Painted Structural Materials

To ascertain the best methods for preparing iron and steel surfaces for painting, a sub-committee of the general committee on Preservation Coatings for Structural Materials, has prepared a large number of test panels that now are being exposed on a permanent test rack, located on the roof of one of the shops of the Pennsylvania Railroad Co., Altoona, Pa., and a duplicate set of panels is being exposed on a rack on the Cheesman & Elliot plant near the United States navy yard in Brooklyn. All of the steel panels were furnished by the Pennsylvania railroad, one set being from the same heat and are 24 x 36 inches and ⅛ inch thick. These panels analyze as follows: Carbon, 0.107 per cent; manganese, 0.42 per cent; silicon and phosphorus, 0.008 per cent; sulphur, 0.032 per cent, and copper, 0.031 per cent.

The other set of panels consists of sheets removed from old freight cars, on which approximately 10 to 25 per cent of the surface had become rusty in spots, which it is believed was started by mechanical injury. These sheets are 20 x 30 inches and ⅛ inch thick. While these sheets were not necessarily from the same heat, they were all rolled under the same specifications, and a chemical analysis of one of them follows: Carbon, 0.134 per cent; manganese, 0.42 per cent; silicon, 0.009 per cent; phosphorus, 0.015 per cent; sulphur, 0.037 per cent, and copper, 0.031 per cent.

Duplicate sets of panels were differently prepared for painting for each of the 16 tests. Some of the sheets were

painted as received from the mill, while others were sand-blasted, pickled, etc., to remove rust, scale, etc. The sheets taken from old freight cars were variously prepared before painting to ascertain the beneficial effects of these different treatments before applying the pigment to the surface of the steel. Sufficient time has not yet elapsed to determine what influence the various preliminary treatments of the surface will have on the durability of the paint films, although a report may be submitted next year, which will clearly outline the proper method of preparing iron and steel surfaces for painting.

Non-Ferrous Metals and Alloys

A REPORT on nonferrous metals and alloys, presented by William Campbell, chairman, included tentative specifications for non-ferrous alloys for railway equipment in ingot, castings and finished car and tender bearings, as well as a revision of the specification for spelter. Other tentative standards presented included brass for forging rods and free-cutting brass rods for use in screw machines.

W. M. Corse, chairman of the subcommittee on sand cast metals and alloys, reported that his committee has been collecting data according to the plan outlined last year, and the results of the tests of the following alloys were presented:

Copper, 88 per cent; tin, 10 per cent and zinc, 2 per cent.

Manganese bronze.

Copper, 80 per cent; tin, 10 per cent and lead, 10 per cent.

Copper, 90 per cent and aluminum, 10 per cent.

Aluminum, 92 per cent and copper, 8 per cent.

G. H. Clamer, chairman of the subcommittee on white metals, stated that it is highly desirable that no specifications for white metals shall be recommended until standard methods of analysis and sampling are agreed upon.

Spelter Specifications Revised

In presenting its report of the five alloys previously referred to, the committee on sand-cast metals and alloys stated no attempt has been made to prepare specifications, but the data are given as results which can be obtained when these alloys are cast by the methods described. The committee states that it is a well known fact that these physical properties, while comparative for the alloys under consideration, cannot be expected to represent the physical properties of the metal in the castings. Therefore, the figures presented cannot be used by engineers in calculating the strength of the materials, except with a liberal factor of safety, because the physical properties of a casting are dependent largely on its size and form. In the opinion of the members of the sub-committee, the values for tensile strength and yield point in actual castings are 50 per cent less than values obtained with test bars.

Proposed tentative specifications for non-ferrous alloys for railway equipment include the following:

Bearing metals Nos. 1 and 2, for connection-rod bearings, bushings, eccentric straps, driving-box bearings, trailer-truck bearings, cross-head jibs, hub liners and miscellaneous bushings.

Bearing metals Nos. 3 and 4, for lead-lined bearings, for locomotive tenders, freight and passenger car equipment.

Bell metal for locomotive bells only.

Babbitt metal for babbitting driving boxes, rod brasses, cross-heads and for hub liners.

Lining metal for lining truck brasses, tender brasses and car brasses.

In the proposed revision of the standard specifications for spelter, the limit for cadmium in high-grade spelter was increased from 0.05 to 0.07 per cent. The limit for lead in prime western grade spelter was increased from 1.50 to 1.60 per cent and the limit for iron was increased from 0.06 to 0.08 per cent. Changes also were made in the paragraphs relating to the method of sampling.

Alfred D. Flinn and Ernst Jonson were the joint authors of a paper entitled "Inspection of Brass and Bronze". It was pointed out that during recent years many failures of brass and bronze have been noted and that they have occurred in cast as well as in wrought metal which had fulfilled the requirements of the standard specifications, and indicate that these specifications are inadequate. They stated that the service strength of brass and bronze is dependent not on the ultimate strength, but on the yield point. Therefore, the true yield point should be specified and a method should be devised for determining the yield point more accurately than can be done by the current method. A test in which the load is applied in increments of five minutes is recommended. It was also pointed out that it is common practice to burn-in defects in brass castings. When a burn-in cools, it may leave initial stress of such magnitude that the casting will fail locally. Therefore, specifications for brass and bronze should provide for annealing all castings that have been repaired by burning-in. It was pointed out that molten copper is susceptible to oxidation and that oxidized brass and bronze is of low strength and gives low elongation. It was recommended, therefore, that a tensile test with a suitable elongation requirement be included in every specification for cast brass or bronze.

In his paper on the "Interior Surface Defects on Brass Condenser Tubes as a Cause for Corrosion", W. Reuben Webster, stated that it is the belief of some engineers that defects on the interior surface of brass condenser tubes acts to accelerate corrosion and accordingly their presence even to a small degree, should not be tolerated. Extended observation has failed to furnish a basis for such belief. The variety of corrosion which exhibits itself in local pitting resulting in perforation, takes place independently of any interior defects which may exist and no tendency of the pitting to localize at a surface defect has been observed. Reproductions and photographs of the interior surfaces of corroded tubes, both with and without defects, were shown, which clearly indicated that corrosion takes place independent of these defects.

Other papers presented included the following: "The Hardness of Hard-Drawn Copper", by E. H. Pierce; "The Electrolytic Determination of Tin on Tinned Copper Wire", by George G. Grower; "Light versus Heavy Reduction in Cold Working Brass", by W. Reuben Webster, and "The Testing of Sheet Brass", by Charles H. Davis.

Proposed Administrative Changes

The present method of designating the committees of the Society by letters and numbers was questioned in a statement submitted by the sub-committee on classification of standing committees and standards. It was stated that it is the practice among national societies to designate their committees by descriptive names indicative of their character. It was recommended that the committees be classified into the following four groups: Metals, non-metal (inorganic), organic and miscellaneous (composite) —specifications involving the use of two or more materials of the other groups. In each group there is a tri-unity of functions that relate to materials, methods and nomenclature. The sub-committee stated that the elimination of letters and numbers is highly desirable for the reason that the title of a committee does not affect its classification and its position, therefore, can be changed without disturbing its title. The formation of a committee on technichal committees also was recommended, to be composed of the chairmen of existing committees of the Society or their authorized representatives. The duties of this committee shall be to create, classify and outline the scope

of the work of all committees; to promulgate regulations governing technical committees; to draw up rules governing the form, but not the substance of standards and to arbitrate committee disputes.

How to Test Refractories

ANOTHER phase of the activities of the Society was revealed in the report on refractories which presented a tentative test for refractory materials under load at high temperatures; a tentative test for the slagging action of refractory materials and tentative methods for the ultimate chemical analysis of refractory materials. These standard tests and methods will prove of the utmost value to blast furnace and steel works operators and furnish the first guide to the producer of refractories as to the exact requirements of his trade.

C. E. Nesbit and M. L. Bell described a slag test for refractory brick used in the iron and steel industry, which constituted an appendix to the report of the committee. They stated that early in the study of the physical properties of refractory material in the iron and steel industry, the necessity for a slag test which would give information as to the relative resistance of refractory brick to various slags and fluxes became apparent.

As a basis for a test it was decided to place the brick in contact with a certain slag and apply heat until the slag was thoroughly melted. When cold the amount of penetration was observed. Drilling by means of a press was resorted to, and uniform pockets as near as the nature of brick material would permit were drilled. The bricks were then heated to testing temperature and a known quantity of slag was placed in the drilled cavities. After the bricks had become cold they were broken through the slag cavity and examined. Visual examination proved of small value, as results could not be accurately compared; hence it was found necessary to devise some means by which the amount of penetration could be measured. This was accomplished by sawing the brick so that one of the sawed faces accurately bisected the center of the original cavity, and the area of slag penetration thus exposed was then measured by means of a planimeter.

To standardize the method it became necessary to determine whether the fineness of the slag, the time to which the slag was exposed to the brick, and the amount of slag used in the test had any effect upon the amount of penetration.

To determine the effect of fineness of the slag on the amount of penetration, blast furnace and heating furnace slags were selected as representative of the iron and steel industry. Each was ground and separated into two sizes, coarse and fine. The coarse material was that which passed a 40-mesh and remained on a 60-mesh sieve, while the fine was represented by that which passed through a 100-mesh sieve. The slag test was then run in the usual manner on standard hearth and bosh blast furnace brick. The average results were as follows:

Blast furnace slag, 40 to 60-mesh, penetration, per square inch, 1.54; 100-mesh, penetration, per square inch, 1.67.

Heating furnace slag, 40 to 60-mesh, penetration, per square inch, 1.77; 100-mesh, penetration, per square inch, 1.72.

From the foregoing results it is apparent that the degree of fineness of the slag does not affect the penetration.

To determine whether the time to which the slag was exposed to the brick, and also whether the amount of slag used in the test affected the penetration, a series of slag tests were run, in which the slag was exposed to the brick at testing temperature for 2, 4 and 6 hours, with the quantity of slag varying from 35 to 140 grams.

The tests showed that the amount of penetration is not increased by keeping the brick in contact with the slag for a longer period than two hours. Preliminary work has shown that one hour would in most cases give complete penetration, so that the adoption of two hours was considered sufficient to guarantee full action of the slag.

The question of the advisability of performing a slag test in a drilled pocket as compared to immersing the brick in molten slag was next studied. Bricks from the same shipment were tested, one-half of them by the drilled pocket method in the usual way, while the others were placed on edge in a refractory tray or shallow box, in which slag was placed to a depth of 1½ inch. All were heated at a uniform rate to 1350 degrees Cent. and held for 1 hour. After cooling the bricks were cut at right angles to their length into two or three sections, the cuts being about 1 inch apart. The drilled pocket samples were cut in the usual way, a second cut being made at right angles to the first. The areas of slag penetration thus exposed were measured with a planimeter; also, the linear inches of slag contact on the surface of the brick were measured. Heating furnace slag was used in this test.

The tests indicated that greater uniformity of results is obtained by use of the drilled pocket than by immersion. The drilling of pockets to contain the slag is also preferable to the use of large trays to contain the slag, because of economy of space in the furnace.

When clay bricks for blast furnace or similar uses are to be tested, blast furnace and heating furnace slags are used. Silica bricks for open-hearth use are tested with open-hearth and heating furnace slags.

The object of the test for refractory materials under load at high temperature is to determine the resistance of the specimen to deformation at a specified temperature for a specified time. The test specimen is a standard 9-inch brick placed vertically on end. In the case of blocks or shapes, sections approximately 9 x 4½ x 2½ inches shall be cut, utilizing as far as possible, existing plane surfaces. Both silica material and fire clay are heated for six hours at varying temperatures, in degrees Cent., as follows: Silica material, first hour, 200; second hour, 500; third hour, 900; fourth hour, 1350, and to the end of the sixth hour, 1500. The hourly temperature periods for heavy duty fire clay are 500, 900, 1150, 1300 and 1350; for moderate duty fire clay, 500, 850, 1100, 1250 and 1300 and for light duty fire clay, 500, 750, 950, 1050 and 1100. At the expiration of the time of heating, the supply of heat is stopped and the furnace is allowed to cool for not less than five hours before removing the load and examining the test specimen.

More Ferro

To Be Made by Miami Metals Co. at Goshen Furnace Just Acquired

Chicago, July 29. — Additional production of ferromanganese will result from the recent purchase of a blast furnace stack at Goshen, Va., by the Southeastern Iron Co., a subsidiary recently formed by the Miami Metals Co., Chicago, formerly the Miami Products Co. The stack is being rebuilt and refitted. It will be put in blast next fall. Though it will be operated on pig iron for the most part, plans are under way for making ferromanganese when circumstances warrant. Furnace operation will be under the direction of H. A. Brassert, of the Illinois Steel Co., who has been in charge of ferromanganese production at South Chicago. The Monominy mine at Gaastra, Mich., has been leased and ore will be shipped through Escanaba, Mich., to Goshen. Manganiferous ores will be obtained from sources now supplying the Chicago stack of the Miami company.

Tool Exporters Confident of Future

Large Foreign Business After War Assured if Energy in Domestic Markets is Duplicated is Slogan of Springfield Meeting—Quality, Not Price Should Dominate Policies

"AMERICAN machine tool sellers may look forward to continued good export business even after the close of the war, provided they exert efforts abroad such as they would exert in their domestic business."

This is the composite of expert opinion expressed at the "Metals Day" session of the First Annual Industrial Exposition and Export Conference held at Springfield, Mass., last week. The views thus set forth are worthy of more than passing notice for they are the fruit of close study of foreign markets and of practical experience in foreign selling. Several handicaps which operated against the American industry in the past were declared removed or at least lessened. Among these was the previous lack of American merchant marine; the high wages and short workday in American plants as compared with those abroad; and the former absence of adequate banking facilities in foreign markets. The huge shipbuilding program now under way and the better understanding on the part of the public of the value of a merchant marine, which should assist in speedy remedial legislation, were cited as laying the foundation for American leadership on the seas. The heavy taxation abroad growing out of the war and the increased desire of the individual for better living conditions were predicted as being factors preventing the return of wages to pre-war levels. The establishment of many banks abroad since the war again has greatly assisted American exporters. The tendency on the part of banks to co-operate with American manufacturers is steadily gaining.

Per Man Value is Greater

Further, as Adolph W. Gilbert of the Chapman Valve Mfg. Co., Indian Orchard, Mass., pointed out in his paper on "Metal Fittings in Overseas Trade," American plants have a much larger percentage of high-powered and high-class foremen and managers.

"These men," said Mr. Gilbert, "are constantly studying and applying new and efficient methods of factory practice. Their intelligent work, together with the sure increase of average intelligence of what is termed the 'worker' brought about by the liberty of individual action and thought made possible by our free democracy, enables American factories to produce greater invoice values per man than is produced in factories out of the United States. . . . . It is inconceivable that the manufacturers of this country will ever again after the war contend with the former foreign wage scale or day hours, but they will have to contend in a more or less remote future with added intelligence and a tendency on the part of foreign factory labor to overcome its handicap of less tonnage and invoice product per man, for democracy tends to raise the intelligence and brain power of the individual."

Mr. Gilbert said that the questions of immigration and of increased woman labor were uncertain factors and subjects of discussion, but that the question of the uplift of the individual with the triumph of democracy does not admit of discussion. Continuing, he said: "I want to impress upon you what I firmly believe: that this war will lay for ever the great bugaboo of cheap foreign labor and long working days in foreign plants; but I warn you that in allaying this danger, you cause to rise out of the great struggle a new danger to factories in this country seeking a foreign market for metal fittings. You bring in as your competitor the power arising from increased intelligence of the high-powered and low-powered worker which will be backed and urged on by necessity."

For American industry to obtain and retain a place in foreign trade, Mr. Gilbert emphasized, we now more than ever must have organization and co-operation not only among manufacturers and competitors but between employers and employes.

After pointing out the need for export trade to assure prosperity in our machine tool and hardware industry, Oran O. Gallup, export manager of the Simonds Mfg. Co., Fitchburg, Mass., took up the case of those manufacturers who have never shown any interest in this class of trade. He said, in part:

"These firms are doing export business now. They have had it forced upon them by conditions existing. Of course much of this business is handled by New York exporters so that the manufacturer has been able to receive any terms which he desired to dictate and has been able to avoid any of the details usually so necessary to the proper conduct of foreign trade. Nevertheless it is export business. Demand and reputation are being established by the goods now being sent abroad under such attractive conditions. For these manufacturers, the war has accomplished the same results as several years of endeavor and expense have done for many of us in the past.

"How are these firms going to profit by these conditions? If properly followed up, their export business can be maintained without any of the troubles or expense of introductory work. If, however, these manufacturers feel that this business will continue without further solicitation or attention, there is disappointment ahead. 'Plan and prepare now' should be the policy for this class of manufacturers.

"Now the question—Can our tools be sold in these countries—the homes of our competitors? Most emphatically *Yes.* This is not an expression of personal opinion but a statement of fact, justified and substantiated by actual sales made by United States manufacturers in these very markets.

"How has this sale and demand been created? Have American manufacturers met these extremely low prices of European manufacturers as always advised by our critics? In a few cases, yes. Some instances have been found where the American manufacturer has been able, through improved methods, use of automatic machinery, standardization of product and efficiency measures, to make his products at a price to compete against goods made by the low-priced European labor.

Meeting Low Prices

"To most of us, with our comparatively high costs of manufacture, it is a more difficult problem. How can we possibly meet these low prices? My answer would be—*do not meet them.* You can only do it by cheapening the quality of your goods which is the last thing you should do.

"There is a better basis on which we can compete. If your articles are higher in price, then produce goods which will be worth more and give enough value for the higher cost to make it an object for the consumer to buy. Practically all the tools which are being sold in these competitive countries are high-quality, high-priced articles for which a demand has been created upon this basis.

"Do not let the expression 'Euro-

pean low prices' frighten you in advance. It can only eliminate your product when your goods are only equal to the low priced goods manufactured abroad. Make your quality higher and your price fair and you have the same fighting chance to procure business as you have in your domestic market. You have to work to maintain your business here and you can rest assured that the export trade is not going to be handed to you without any effort on your part.

"Our firm has found it impossible anywhere to nearly meet the prices of European manufacturers, yet we are able each year to increase our business in the competing countries. As an example, consider the saw competition in England. There are congregated in Sheffield more than twice as many saw manufacturers as there are in our whole country. They manufacture at extremely low prices. To sell saws in Sheffield is like taking coals to Newcastle. Yet we have sold and are regularly selling Simonds saws in Sheffield to users who are willing to pay *double* the Sheffield price for the increased results and efficiency procured from our goods.

"As already stated, if in the European market we can work up a successful export business in tools, hardware and steel products, then there is no reason why we cannot be very successful in the other markets of the world if we conduct our export business upon the proper basis.

"Some manufacturers are held back by the idea that their lack of knowledge in regard to export eliminates them from competing. This idea is absurd. You can take a member of your own organization with certain qualifications and by having him work in co-operation with such organizations as the Export Managers' club and the National Association of Manufacturers, get the benefit of the experience of the pioneers in these markets and avoid many of the difficulties and embarrassing conditions which others of us have had to experience in the past.

Quality is Important Factor

"Proud as I am of American export trade and the fact that American goods are becoming so favorably known for their quality and reliability in all parts of the world, I am not making a plea for the American manufacturer to enter the export trade for patriotic reasons alone. It is a duty which you owe the economic development and prosperity of our great country. It will be a necessity for the future growth of your business and even the maintaining of present production. 'Plan and prepare now.'"

That the close of the war will see no decrease in foreign demand for machine tools owing to the immense need for reconstruction purposes, was the view expressed by C. O. Smith, export manager of the Norton Grinding Co., Worcester, Mass.

"We must not forget that the return of the hundreds of thousands of soldiers who are now held prisoners in Germany will awaken among their people desires for the better things of life and they will be satisfied with nothing short of an approximate fulfillment of these desires. Not a small part of this fulfillment will consist of better transportation facilities. Vast stretches of territory must in the near future be covered with a net-work of railroads, that the exports and imports of these countries may be efficiently handled. Regardless of the apparent favorable competitive conditions and the essential needs for the work of restoration as well as the meeting of normal demands, our prosperity following the war will be largely dependent on the restoration program.

"Indications are not lacking that Europe contemplates an eventual industrial development far beyond that attained prior to the war, thereby utilizing a large proportion of that great army of metal-workers which during the present crisis is so valiantly supporting the armies at the front. Heavy purchases of machinery have been and are being made, largely for use after the war and providing for production far in excess of what has been a normal output. This applies particularly to the automobile and motor truck industries. This may very properly be construed as a step in anticipation of a serious shortage in transportation facilities as one of the outcomes of this war.

"For some time following the war's close we must expect to be more or less handicapped through a lack of shipping facilities. This will impose a heavy expense in the delivering of American-made goods; a condition, however, which will steadily improve. Should the present activity of our shipyards be maintained our merchant marine may attain proportions such as will place America in the front rank as a maritime nation for the first time in over 50 years, making possible the carrying of American-made goods largely in American bottoms.

"As many of the South American states are co-operating with us in the world war we have reason to believe this channel of trade will remain open to us, just how long depends almost entirely on the efficiency with which we marshall our forces in the effort to win that which is logically our birthright."

Thursday morning's session of the exposition was given over entirely to the metal trades, Charles E. Hildreth, general manager of the National Machine Tool Builders' association, Worcester, presiding. At noon, the metal men to the number of over 200, enjoyed a sheep bake which was arranged by the exposition committee in conjunction with the secretaries of the New England branches of the National Metal Trades association.

Other sessions of the exposition extending over the entire week were devoted to conferences dealing with other classes of New England's industries, including paper, textile, shoe, rug, leather, twine and other grades. There were hundreds of exhibits of these various industries, also an extensive exhibit by the United States department of commerce in the capacious exhibit building at the Eastern States exposition ground. Another large building was given over to exhibits of welfare and safety work.

Prepare for After the War

The conference was planned to bring together men now interested in exporting or who may later wish to enter the export field, to discuss present and after-the-war conditions, and, through the exchange of views and opinions, endeavor to assist the American manufacturer in paving the way for trade extension. The Industrial Exposition and Export Conference was planned and directed by a general conference headed by Frank H. Page, president of the National Equipment Co. This general committee was named by the executive committee of the Eastern States exposition, an organization whose sole function is to improve business and living conditions in the North Atlantic states. Assisting the general committee is an advisory council of men prominent in the industrial and financial welfare of the United States. Co-operating with the general committee are the department of commerce of the United States, the National Association of Manufacturers, bankers and other organizations interested in foreign trade.

The heating and engineering department of the E. F. Houghton Co., Third, American and Somerset streets, Philadelphia, has been sold to the Bishop-Babcock-Becker Co., Cleveland. The latter will add the line of steam and temperature-controlled devices made by this department of the Houghton company to its present line of specialties.

Baker Upsets Federal Price Plans

President Probably Will Be Forced to Take a Hand to Harmonize Conflicting Positions of Secretaries of War and Interior on Coal and Other Products—Iron and Steel Arrangement Waits

Bureau of The Iron Trade Review,
708 Metropolitan Bank Bldg.,

WASHINGTON, July 2.—Just when a working precedent was to be established insuring team play between the government and groups of manufacturers of basic war supplies in price adjustments, the attack by Secretary of War Baker upon the arrangement made with the coal operators by the coal production committee of the council of national defense has put things up in the air completely, for the time being at least. Secretary Baker's statement in his letter to W. S. Gifford, director of the council of national defense, that the "price of $3 suggested or agreed on as maximum is an exorbitant, unjust and oppressive price", rings harshly alongside of Secretary of the Interior Lane's previous eulogy of the coal operators when he said, "You have been up against an extremely odd situation, and how you have acted here and met the situation is magnificent. I think you have reason to be proud of what you have done. If all the industries in the United States will make the same effort, there will be no question as to whether our people can mobilize our resources." This manifest lack of harmony over the all-important price question in the President's own official family, reveals an unfortunate situation to which interceding development may be the sequel. In its present light, it stands as another controversy which the President must take upon himself to settle.

Secretary Baker, writing as president of the council of national defense to Mr. Gifford, says that the council "has no legal power, and claims no legal power either to fix the price of coal, or to fix a maximum price for coal, or any other product. The coal production committee is a subordinate committee of the council of national defense, purely advisory in its character, formed for the purpose of advising the council as to steps which might be recommended leading to a stimulation of production and distribution of coal. No power has been even attempted to be delegated to it to consider or deal with the question of price, and any action taken by that committee, or sanctioned by the committee dealing with price, either fixed or maximum, for coal is clearly beyond the legal power of the coal production committee and of the council of national defense from which the committee derives whatever authority it has."

Secretary Baker says that his familiarity with the progress made by the federal trade commission in its investigation of the cost of coal production leads him to believe the $3 price is much too high.

Coal Adjustment Takes Lead

The plan arranged between the coal operators and government officials provides for marked reductions in the price of bituminous coal at all mines east of the Mississippi river, ranging from $1 to $5 a ton to the public, with a further cut of 50 cents for the government. The 400 operators, who came to Washington at a call from Secretary of the Interior Lane, pledged themselves to furnish their product by committees from each mining district. Previously they had agreed to place the price fixing in the hands of the government through Secretary Lane, Governor J. Fort, of the Federal trade commission and the coal production committee of the council of national defense. Francis S. Peabody, a prominent coal operator, being chairman of the committee. In addition to placing prices upon coal at mines, it was announced that jobbers, brokers, retailers and commission men would be permitted to charge commissions of not more than 25 cents a ton and that not more than one commission should be charged. Trade secrets between competitors, cost prices and other confidential information were laid openly before the government which decided what would be the highest prices paid at mines, beginning July 1, to stay in effect until investigations are made and other changes ordered. Minimum prices at which coal could be furnished from the various states were quoted and met with the entire approval of Chairman Peabody, Gov. J. F. Fort and Secretary Lane. The prices are not applicable to coal for export or for bunkers and necessarily do not affect contracts or sales made previous to July 1. The agreement pertains to soft coal only, but anthracite producers have indicated their readiness to meet the government in the same spirit shown by bituminous operators.

The question of iron and steel prices in a considerable measure has rested upon that of coal and its allied product, coke. With the settlement of coal and coke prices, it has been felt that the steel producers have a safer and more intelligent basis upon which they can take up negotiations with the government as to prices to be granted it and perhaps to the general consuming public. While the latter proposal is admittedly most unusual there is insistence in both administration and congressional circles that it be adopted. These circles, too, for the most part, actually seem to be desirous that the industry be allowed fair and reasonable profits and given every encouragement for its stimulation. It is felt that by meeting the demands of those who seem to be sincere in their plea that they want to help the industry, manufacturers will anticipate and forestall the efforts of the small minority who are urging radical action such as fixing of ruinous prices or the commandeering of plants. It is plainly recognized by the conservative element, both of the administration and of congress, that the fixing of absolute minimum or maximum prices cannot be done successfully. The prevailing idea seems to be that not only should the prices be subject to readjustment as circumstances may require, but also determined upon a basis of conditions and localities of the trade.

It is needless to mince words about the situation. Unless a clearer understanding than now exists between the government and steel manufacturers is brought about at once, radical legislation and action by the government seems assured. On the other hand, sweeping and hampering control of the industry by the government may be prevented if such an agreement is reached.

Meanwhile, the senate committee on interstate commerce is planning to go ahead with hearings on several bills, drafted or in prospect, for the fixing of prices of steel, copper, iron ore and other "basic" metals, as well as the Cummins bill to fix prices of railroad materials of all kinds. Also, as pointed out in The Iron Trade Review last week, the so-called food and fuel control bill has been extended in scope so as to provide for the regulation of prices of iron and steel and their prod-

ucts, farm implements, petroleum and its products, and binding twine, fertilizer, etc. These items were written into the bill by the senate committee on agriculture at the insistence of farmers throughout the nation who contended that if prices of their products are to be controlled the government should also control prices of products they purchase.

Cost Probe to be Extensive

While the investigation as to the cost of production in the steel industry being made by the federal trade commission upon order of the President is believed to have been inspired largely by the controversy between Chairman William Denman of the shipping board, and Maj. Gen. George W. Goethals as to the price of structural material for merchant ships, the inquiry is to be comprehensive. Governor Fort, of the commission said it would be thorough in all respects, and include everything from iron ore to finished products, taking into account such important items as labor costs and the prices of alloys. Nothing could be disclosed this soon, it was said, as to how many investigators the commission will have work, where they are to operate, their plans of operation or when the work will be completed. It was stated, however, that the investigation will be hurried as much as possible commensurate with thoroughness.

Defense Council Under Fire

Efforts under way for some time past on the part of a small element in congress to break down the council of national defense and its subordinate bodies of business men who are serving the government gratis are about to come to a conclusion one way or the other. In view of the fact that the council and its organizations are supported by the administration and apparently by a strong majority in congress, it is probable that these efforts will fail.

The attack being made by certain members of congress on subordinate bodies of the council is reflected in an amendment written into the food control bill by the senate committee on agriculture making it unlawful for any paid or volunteer member of an advisory committee of the government to attempt to procure or to make any contract for supplies to be furnished by companies in which he is a stockholder or otherwise interested. Plainly this provision is directed at the committees of the advisory commission of the council. Necessarily members of the commission and its committees include men connected with some of the largest supply firms and corporations in the country, which organizations are being called upon to furnish the government munitions and equipment of all kinds.

Government Will Pay All War Bills Promptly

Washington, July 3.—Recognizing that large amounts of working capital are required in filling contracts, the war and the navy department have both taken decisive action to make sure that contractors who are selling materials to the government are paid more promptly even than is the practice in general business. Announcement has been made by both departments that they have reached this decision for the purpose of assisting in every way to prevent funds from being tied up.

At the same time, Secretary of the Navy Josephus Daniels has asked congress to pass legislation to permit the government to advance money to war contractors and thus prevent a threatened shortage in manufacturing facilities. Secretary Daniels said that many contractors for military supplies are unable because of a lack of capital, properly to extend their manufacturing plants. Advances of money on their contracts, he said, would relieve this difficulty. He asked that existing laws be amended so as to allow the government to make a 30 per cent advance on the amount of awards to contractors.

Small Effect on Iron and Steel From Rate Rise

Washington, July 3.—Effective July 1, a horizontal advance of 15 cents per ton in rates throughout the country on bituminous coal, coke and iron ore was granted by the interstate commerce commission in its decision June 29 in the so-called 15 per cent advance rate case of the railroads. Southern and western carriers, which asked for increases in rates on these commodities on a percentage basis, were given permission to change to a specific 15 cents advance. These increases do not apply to those rates on coal, coke and ore recently advanced 15 cents under separate proceedings, and pertaining to iron ore from Lake Erie ports, to lake cargo and tidewater coal and to coke from the Connellsville and West Virginia regions.

Railroads in official classification territory, situated east of the Mississippi river and north of the Ohio and Potomac rivers, were allowed to increase class rates per hundred pounds to 90 cents for first class, 79 cents for second class, 60 cents for third class, 42 cents for fourth class, 36 cents for fifth class and 30 cents for sixth class. Eastern roads were also allowed to benefit through permission given by the commission to raise rail-and-water rates to a level of all-rail rates. Preliminary estimates have it that the increases allowed amount practically to from 8 to 10 per cent in eastern territory. Southern and western lines were denied all increases, except those affecting rates on coal, coke and ore, while the general petition of the eastern lines was also denied save in the instances named.

As a consequence of the decision rates on pig iron and steel products will remain unchanged except for the relatively few materials that move under class charges. Steel products, in the vast majority of cases, move under commodity rates in specially prepared tariffs, but on the fifth class basis.

The decision is designed to fully dispose of the case for the present, at least. While technically suspensions are ordered until Oct. 28, the report says further examination of the matter immediately would be fruitless. In this connection, however, the commission indicates that if future developments warrant, it will give the carriers further redress.

Centralize Wide Control in Foreign Trade

Washington, July 3.—Coal and wheat being the first products whose exportations are to be controlled by virtue of the recently enacted export control bill considerable interest is being manifested as to other products that may be added to the list from time to time. The first formal recommendation as to the control of exports was signed last Thursday by the members of the new board of export control. Attention had been given by the council to bunker coal for cargo-carrying ships through regulating the amount of this coal taken from the United States the President can control shipping. Such a control through operation of a licensing system for bunker coal was subsequently discussed by Secretary of Commerce William C. Redfield and Chairman William Denman of the shipping board. It is understood to be the intention of the government to force ships into necessary trades and to draw from neutral and allied harbors shipping now held there because of fear of submarine attack.

Reliable reports are current that the President is considering barring shipments of pig iron to Holland, Scandinavia and Switzerland.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

R. A. BULL, former president of the American Foundrymen's association and former manager of production of the Commonwealth Steel Co., Granite City, Ill., has resigned as general manager of the Chicago Steel Foundry Co., to become vice president and general manager of the Duquesne Steel Foundry Co., Pittsburgh. Mr. Bull took charge of his new duties July 2. W. A. Herron, president and general manager of the Duquesne Steel Foundry Co., has resigned.

Charles J. Barr, general manager of the Algoma Steel Co. at Sault Ste. Marie, Canada, has resigned. His successor has not been appointed.

Elwood Haynes, of Kokomo, Ind., inventor of stellite, has been asked by the United States government to make experiments to find a substitute for platinum.

Harry L. Shepler resigned from his position as vice president of the Willys-Overland Co., Toledo, O., July 1. William H. Birchall, superintendent, has succeeded Mr. Shepler.

James G. Heaslet has become consulting engineer of the Studebaker Corp., South Bend, Ind., having resigned a position as vice president in charge of production with the same company.

E. L. Hershey, formerly connected with the Pulaski Iron Co., Pulaski, Va., has accepted a position as superintendent of the Irondale furnace, Irondale, Washington, owned by Pacific Coast Steel Co., San Francisco.

Louis J. Campbell, vice president of the Youngstown Sheet & Tube Co., Youngstown, O., and now in training at the reserve officers' training camp at Fort Benjamin Harrison, Ind., has been made a major of infantry.

J. E. Thropp Jr., who was superintendent of the Sheridan, Pa. blast furnace of the Berkshire Iron Works, owned by E. J. Lavino & Co., Philadelphia, until transferred to the Marietta, Pa., furnace of the same interests in February, has resigned.

E. John Hicks, vice president of the Merchants Steel & Supply Co., 1810 Continental and Commercial National Bank building, Chicago, has been made president and treasurer, succeeding W. K. Kenly, who has retired from the company. T. A. Schwengel, secretary of the company, has been made vice president and secretary. The annual meeting of the company will be held July 25 to elect an additional director.

C. W. Hays, until recently manager of Boyts, Porter & Co., Connellsville, Pa., manufacturer of pumps, has been made sales manager of the Stroh Steel Hardening Process Co., with offices in the First National Bank building, Pittsburgh.

H. C. RYDING,

Who became vice president of the Tennessee Coal, Iron & Railroad Co., July 1, succeeding Frank H. Crockard, resigned

Herbert A. Johnson has resigned as superintendent of the North & Judd Mfg. Co., New Britain, Conn., to accept the chairmanship of the hardware equipment committee of the council of national defense.

Joseph F. Sees, mechanical engineer for the Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn., has been commissioned as captain, and Joseph G. Woodbury, assistant superintendent of the same company, as major in the ordnance corps of the officers' reserve corps of the United States army.

Henry R. Buck, president and secretary of Ford, Buck & Sheldon, Inc., engineer, Hartford, Conn.; Ernest W. Christ, purchasing agent of the Stanley Works, New Britain, Conn., and John H. Goss, superintendent of the Scovill Mfg. Co., Waterbury, Conn., have been appointed members of a commission of five on factory waste by Gov. Marcus H. Holcomb, of Connecticut.

M. M. Moore, formerly with the machine tool department of Gaston, Williams & Wigmore, Inc., New York, has severed his connection with that organization and now is associated with the sales department of John W. Thorne & Co., Inc., 165 Broadway, New York.

Occupies New Galvanizing and Forging Plant

The Diamond Forging & Mfg. Co., Pittsburgh, manufacturer of forgings, stampings and galvanized iron and steel products, advises that it is now occupying its new plant on the North Side, Pittsburgh, where the company recently acquired a site of about four acres. The works are located on the main line of the Pennsylvania railroad, one mile from the center of Pittsburgh and shipping facilities also are obtainable over the Baltimore & Ohio railroad. A railroad siding connects the plant with the Pennsylvania railroad. The company has doubled its galvanizing capacity. Equipment in the galvanizing, forging and stamping departments is driven by individual electric motors, and overhead cranes and trolleys command the entire plant. The company has added a stamping department, which will have a capacity of 60 tons per day. New presses, designed for rapid and economic work, have been installed. The stamping department will specialize in pole line hardware. In addition, the company will manufacture a complete line of light forgings. W. D. Henry, president of the National Fireproofing Co., Pittsburgh, is head of the Diamond company. G. Wickersham, vice president and general manager, has been with the Diamond company since its organization, in 1909. D. M. Smith, secretary and sales manager, was one of the organizers. Clarke Painter is treasurer of the company.

New War Uses

Of Internal Combustion Engine Discussed by Automobile Engineers

Washington, July 3.—Specifications it has developed through its standards committee for the new army trucks, standardized submarine chasers, "tanks," farm tractors, and all the modern paraphernalia of war, including plans for the production of the great new aircraft fleet were discussed fully at the semi-annual meeting held June 25 at the bureau of standards by the Society of Automotive Engineers. While the convention was to have lasted only one day, owing to the present national emergency, it was found impossible to present all the papers in that time and consequently it continued over to the second day. About 600 executives, consulting engineers, production experts and designers attended.

President George W. Dunham, in his address, showed what the society has been doing in national affairs in the past and also what it hopes to accomplish in the future. The afternoon meeting of the first day was devoted to a professional session. Papers read included the "Building of Submarine Chasers," by Henry R. Sutphen; "The Farm Tractor Problem," H. L. Horning; "Design and Production of Aircraft in War Times," Wing Commander Seddon; "Classes and Uses of Battleplanes," Lieut. de la Grange.

On Monday evening an informal dinner was held at the New Willard hotel. Speakers included Secretary of War Newton D. Baker, President Dunham, Judge W. Benton Crisp, toastmaster; E. A. Deeds, of the aircraft production board, council of national defense; Wing Commander I. W. Seddon of the British commission and Lieut. Amuary de la Grange of the French commission.

The principal subject before the division on iron and steel pertain to the classification of sheet metal. Progress was reported. It was pointed out that it will be necessary for the division to make a much larger number of tests in order to establish the limits to be applied in arriving at specifications.

Large Quantities

Of Wire Products for Government Distributed by Two Committees

New York, June 30.—The wire and cable committee of the advisory commission of the council of national defense, which was one of the first committees of manufacturers of war supplies to be formed following the entrance of the United States into the war, up to this time has distributed orders for between $2,500,000 and $3,000,000 worth of finished products. This total covers all kinds of insulated wire and cable, principally for the use of the navy department and includes wire and cable for ships, radio wire, telephone and telegraph wire, submarine cables, etc. Further requirements are coming out continually. The committee now is getting ready to distribute approximately 20,000,000 feet of wire for illuminating the army cantonments which now are under construction. The committee, which has headquarters at 114 Liberty street, New York, comprises Le Roy Clark, Safety Insulated Wire & Cable Co., chairman; Wallace S. Clark, General Electric Co., and Edward Sawyer, Atlantic Insulated Wire Co.

This committee represents all of the wire manufacturers with the exception of one or two very small interests and all the companies involved have agreed to give precedence to all government orders distributed by the committee. The prices for the various products, which were determined by the government on the recommendation of the committee, represent approximately the normal market level, which is very much lower than the current market. In many cases the committee has placed the raw material necessary; for instance, it has obtained wire bars on a large scale from the government and had them converted into copper wire for manufacture into insulated wire. More than 800,000 pounds of copper wire already have been manufactured from copper thus obtained from the government. Lead covered cable already placed involves about 1500 tons of lead to be furnished through lead committee; of this amount 500 tons will be shipped in July. In like manner the committee has arranged for other raw materials such as rubber and cotton.

The full membership of the subcommittee on wire products of the American Iron and Steel institute is as follows: Frank Baackes, American Steel & Wire Co., chairman; George Mason, Jones & Laughlin Steel Co., Pittsburgh; John C. Neale, Midvale Steel & Ordnance Co., Philadelphia; H. Sanford Smith, Gulf States Steel Co. and J. E. Frederick, Kokomo Iron & Steel Co. This committee so far has distributed 42,000 kegs of wire nails to be used in the construction of the United States army cantonments.

Obituaries

EDWARD W. ANSTED, president of the Connersville Blower Co., Connersville, Ind., died July 19, at his home in that city. Mr. Ansted was born in Jefferson county, New York, Jan. 24, 1852, and in his eighteenth year removed to Gananoque, Canada, where he engaged in the manufacture of wagon springs. Later he removed to Kalamazoo, Mich., and then to Racine, Wis., where he became associated with the late Michael Higgins in operating the Racine Spring Works. In 1889 he opened a factory in Indianapolis for the manufacture of springs, removing the plant later to Connersville, where it became the nucleus of several other industries. At the time of his death Mr. Ansted held executive positions in several companies, notably the Lexington-Howard Motor Car Co., the Ansted Spring & Axle Co., the Central Mfg. Co., the Indiana Lamp Co., and the Hoosier Castings Co.

James R. Phillips, of the firm of Wm. & J. G. Greey, Toronto, mill machinery manufacturers, died June 22, as the result of burns by molten metal during a casting operation a few days previously. Mr. Phillips, who was 63 years of age, was for 24 years superintendent for the Pease Foundry Co. of Toronto, and became associated with the Greey firm about 15 months ago. He was widely known in the trade and was a member of the Masonic order and the Mystic Shriners. He is survived by a widow and four daughters.

John Bartlett Pierce, Lynnfield, Mass., a founder and first vice president of the American Radiator Co., died in Boston, June 23. The Pierce Steam Heating Co., Buffalo, of which he was the owner, was consolidated with other interests to form the American Radiator Co. in 1892.

Frank L. Bigelow, president and treasurer of the Bigelow Co., maker of boilers, New Haven, Conn., dropped dead of heart failure while playing golf at the New Haven Country club, June 20. He was 54 years old and prominently identified with banking interests of New Haven.

Frederick W. Wurster died at his summer home in Belgrade Lakes, Me., following a short illness. Mr. Wurster was born in Plymouth, N. C., in 1850 and removed to Brooklyn, N. Y., a few years later. As a young man he entered the spring manufacturing business of his father and at the time of his death still was associated with that company.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Model Excess Taxation on English Plan

AMONG the many uncertainties confronting the business world is the problem of war taxation, over which the senate finance committee has been deliberating at length. The committee's decision to drop the present excess profits law in favor of a scheme based upon the principle of the English excess profits law was sensible, but there are several points still being considered, including retroactive taxation and the taxation of individual businesses. The theory of excess profit taxation is based upon belief that industries which benefit most from war time business shall share most heavily in paying the war taxes. While this principle may be considered fair, the present American system is inefficient and contrary to economic principles, in the judgment of the country's leading economists and financiers. An arbitrary figure of 8 per cent has been fixed as legitimate profit. All profits above this figure, it is thus implied, are excess profits and therefore subject to confiscation. During the last fiscal year 8 per cent tax was levied upon the so-called excess, but the house has voted to double this rate in its effort to find sources for the $1,800,000,000 additional revenues called for in the new revenue bill. This was only the second step; with the progress of the war this simple method of rasing funds would eventually absorb all profits above the arbitrary exemption of 8 per cent. That such a contingency would stifle initiative at a time when it is more than ever necessary to stimulate every ounce of energy, enterprise and efficiency is sufficient cause for the senate finance committee's decision to lay out a program approaching the English excess profit taxing system.

The English system in brief is based upon the principle that excess profits constitute the increases of war years over pre-war years. So the English taxpayer chooses any two out of the three years just previous to the war as a standard and is taxed upon the excess over this average. However, no earnings are counted at less than 6 per cent on the capital invested at the end of the last pre-war year. In the case of business not carried on by a company or corporation, 7 per cent is allowed. Thus if the Smith Foundry Co. averaged earnings of only 5 per cent in the years 1912 and 1913, while its 1917 profits are 20 per cent, 6 per cent would be considered average earnings and the difference, 14 per cent, liable to excess profits taxes. Allowance is made in England for increase or decrease in capital during a war trade year at the rate of 6 per cent, or 7 per cent in the case of non-corporate business. In the case of new business, the pre-war standard is counted as 6 per cent on the capital stock, or 7 per cent on non-corporate business.

The iron trade stands well forward among those industries which have financially prospered since the outbreak of the war and it has shown its willingness to bear its share of the war taxation, to buy war bonds and to make reasonable concessions in prices to the government. However, there are a few who believe the flat rate of exemption as now enacted is more just, especially to those companies whose earnings were less than 6 per cent before the war. Undoubtedly the cost should be equitably distributed. That every incorporated company, every partnership and every individual who has gained financially from the war should share proportionately in the cost of the war; should not be debatable. This applies not only to the iron and steel, shipbuilding, machinery and similar industries, which have benefited directly from the war, but also to the wholesale druggist, paper manufacturer, the grocer and butcher and all the thousands of merchants whose sales have been largely increased as the result of war activity and accompanying high wages to labor.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is arranging with British interests for the sale of its controlling stock in the English Westinghouse Electric & Mfg. Co. The culmination of this transaction will separate the American company from the last of its European constituents. The British Westinghouse concern has $5,000,000 preferred and $750,000 common stock and an issue of $6,020,562 of 4 per cent debenture bonds.

Curtiss Aeroplane Prepares For Big Business

At the annual meeting of the Curtiss Aeroplane & Motor Corp., Buffalo John N. Willys, president of the Willys-Overland Co., Toledo, O., was elected a member of the voting trust and J. E. Kepperly, vice president of the Willys company was made a director of the Curtiss concern. Orders for airplanes and motors aggregating $20,000,000 were taken since the last annual meeting. To provide working capital to handle this additional business, the company has authorized an issue of 6300 shares of common stock. Stockholders of record July 3 may subscribe to the new issue at $35 a share. The present stock of the company consists of 60,000 shares of preferred, par value $100 and 150,000 shares of common with no par value. Contemplated extensions of the company's facilities are said to include a $3,000,000 factory in Toledo, adjacent to the Willys plant.

American Car's Munition Business Satisfactory

Very satisfactory results in munition manufacture were obtained by the American Car & Foundry Co. for the fiscal year ending April 30, according to the statement to the stockholders by President W. H. Woodin. President Woodin said: "From the viewpoint of operations and results, the year has been a satisfactory one. The performance of your company in the production of munitions has been gratifying not only as to quality but with respect to volume and speed of production, and has not been excelled by any other company in the United States."

A gross profit of $17,522,909, and a balance of $8,210,872 available for

common stock, are shown for the year, equivalent to $27.37 a share, as contrasted with $2.39 a year ago. Gross profits of $13,017,559 and a net income of $10,310,872 were earned. In 1917, the net income was only $2,816,018. A comparative table of income account follows:

	1917	1916	1915
Total prof.	$17,522,909	$4,595,359	$3,615,054
Ren. rep. etc.	7,212,037	1,779,341	1,284,118
Net	10,310,872	2,816,018	2,330,936
Prfd. divs..	2,100,000	2,100,000	2,100,000
Balance	*8,210,872	716,018	230,936
Com. divs..	1,950,000	600,000	600,000
Balance ...	6,260,872	116,018	80,936
Mt. & impr.	2,500,000	.....	.....
Res. com. div.	†2,250,000	.....	.....
Spec. resv..	‡500,000	.....	.....
Surplus	1,010,871	116,018	80,936
Prev. surp..	25,810,094	25,694,076	25,613,140
Total surp..	26,820,965	25,810,094	25,694,076

*Equal to 27.37 per cent earned on $3,000,000 common stock, as compared with 2.39 per cent the previous year.

†This amount, plus the $150,000 heretofore reserved, makes $2,400,000, or 8 per cent, on common stock.

‡Special reserve for improving working conditions of employes.

New Bon Air Corporation to Develop Ore

Plans have been made by the Bon Air Coal & Iron Co., newly organized with a capitalization of $10,000,000 by W. J. Cummins and associates, to extensively develop the company's iron ore and timber property at Allens creek, Tenn. The furnaces at Allens creek are being repaired as rapidly as possible and soon will be blown in on native ore. A trunk line railroad from Nashville to Corinth is regarded as the next step in the development of the company; $1,000,000 in bonds already have been authorized by the counties through which the road will run.

Financial Crop Ends

The Dominion Foundries & Steel Co., a newly organized $6,000,000 corporation, was formed by the consolidation of the Dominion Steel Foundry Co. and the Hamilton Steel Wheel Co.

* * *

The Seneca Chain Co., Kent, O., has been sold to the Stewart Electric Co., Cincinnati, by Fishel & Marks of Cleveland, who purchased the plant a short time ago.

* * *

A statement recently published by the National Acme Mfg. Co., Cleveland, shows gross earnings of $2,205,000 for the four months ending March 31 and net profits during that interval of $1,657,883. Out of the latter $375,000 was paid in dividends. Cash on hand March 31 amounted to $263,620, making a surplus of $1,282,883.

* * *

The Mishawaka Brass Foundry Co., Mishawaka, Ind., is the firm name of the company succeeding the South Bend Brass Foundry & Machine Co. A specialty is made of brass, bronze, aluminum and white metal castings. The officers of the company follow: George H. Thayer Jr., president; W. H. Young, treasurer; P. M. Thayer, secretary, and James J. MacGuire superintendent.

* * *

An initial dividend of 3 per cent on common stock, payable from the surplus for the year ending June 30, 1917, has been declared by the Colorado Fuel & Iron Co. Disbursements will be made July 25, Oct. 25, 1917, Jan. 25 and April 25, 1918, to stock of record on the tenth of the months specified.

* * *

Total earnings of the Perfection, Standard, Bock Bearing and Western Spring divisions of the Standard Parts Co., Cleveland, for the first five months of the year, were $1,643,403. On a monthly basis, earnings of the four divisions were: January, $303,302; February, $273,797; March, $345,335; April, $360,467, and May, $351,530.

* * *

Officers of the newly organized Parker & Harper Mfg. Co., Worcester, Mass., capitalized at $25,000 manufacturers of screw products and specialties, are: Waldo D. Parker, president; Earl T. Harper, vice president and secretary, and Joseph Harper, treasurer. Screw machine products and specialties will be produced.

* * *

The Brown Portable Elevator Co., Chicago, has changed its name to the Brown Portable Conveying Machine Co. The change was made owing to the increased scope of the company's activities which now include many forms of conveying machinery other than elevating devices. No change is made in the company's organization.

* * *

The Merrill Sheet Metal Works, Merrill, Wis., recently chartered with $25,000 capital, has elected the following officers: William T. Alpine, president; L. J. Beloth, vice president; and George Pavlich, secretary and treasurer. As heretofore, the company will do general sheet metal work, and will install furnace heating and blow pipe ventilation systems.

* * *

The Hart Mfg. Co., formerly of Grand Rapids, Mich., has been incorporated in Kentucky with $60,000 capital and will continue the manufacture of heating and ventilating apparatus in a new plant at Louisville. Officers of the company are: A. E. Hart, president; P. E. Gordon, vice president; H. K. Cole, secretary-treasurer, and C. E. Olson, general sales manager.

* * *

The reorganization committee of stockholders of the Termaat & Monahan Co., Oshkosh, Wis., manufacturer of gasoline engines, lathes and other machinery, has offered the Oshkosh Savings & Trust Co., receiver, $30,000 in cash for the property; the purchasers to assume all encumbrances. The Termaat & Monahan Co. went into the hands of a receiver last fall and was operated under the direction of the receiver until April, when its existing contracts were fulfilled. If the reorganization committee's offer is accepted, it is intended to reopen the plant.

More Toluol

Placed for Government Trinitrotoluol Needs—Other Explosive Crudes Quiet

New York, June 30.—The placing of another comparatively small quantity of toluol for conversion into trinitrotoluol for the United States government, was one of the principal developments in the coal tar products market this week. Toluol continues to be quoted at $1.75 to $2 for spot and at $1.50 to $1.75 for contract. Developments with respect to benzol and phenol, the other two by-products whose chief use under present conditions is for conversion into high explosives, have been quiet. As previously reported, large foreign contracts for benzol and phenol continue to be held up pending the establishment of new purchasing arrangements for the allies in this country. Pure benzol continues to be quoted at 55 to 60 cents per gallon, both for spot and contract. Although phenol recently has sold as low as 36 and 37 cents per pound, at producers' plant, the general market continues to be quoted at 38 to 40 cents both for spot and contract shipment.

Activity in solvent naphtha continues only fair although the improvement noticed in this product in recent months is maintained. In general, however, strength is lacking. Quotations on solvent naphtha are unchanged at 18 to 25 cents per gallon, for spot, and at 18 to 22 cents for contract. Developments in sulphate of ammonia during the past week have comprised chiefly sales of a few spot carloads. No further contracts have been placed and requirements of consumers generally are pretty well taken care of, at least over the next six months, and in many cases over the year to July, 1918. Sulphate of ammonia continues to be quoted at $4.85 to $5 per 100 pounds, at seaboard, for spot and at $4.40 to $4.50 for contract.

Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.75 to 2.00
Solvent naphtha	.18 to .25

Per Pound at Producers Plant.

Phenol	$0.38 to .40

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$4.85 to 5.00

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.55 to .60
Toluol	1.50 to 1.75
Solvent naphtha	.18 to .22

Per Pound at Producers Plant.

Phenol (nominal)	$0.38 to .40

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$4.40 to 4.50

"No Tools, No Ships" is Yards' Cry

Engineering Equipment is Scarce and Shortage is Felt by Vessel Builders—Goethals Gives Little Support to New Yards—Cranes Are Center of Attention—Price Advances Appear—Deliveries Recede on Some Lines

MUCH LESS interest is apparent among machine tool and crane dealers now than in previous weeks, relative to the requirements of ship builders. A short time ago the market was alive with rumors of big equipment orders pending for projected plants, now the excitement has largely subsided. Some big orders for shipyard machinery and shipbuilding cranes have been placed, while other heavy inquiries are definitely known to be pending. But many of the hundreds of projected yards have made little progress. While General Goethals has indicated his willingness to buy any ships that may be delivered, whether wooden or steel, he has not been inclined to assist many of the new companies to obtain equipment and materials, which action would be a necessity for the completion and operation of the proposed yards, in view of the present market situation. Deliveries on cranes, punches and shears, plate rolls and other shipbuilding tools cannot be obtained in less than seven or eight months, which would mean that new ways could not be completed until well into 1918. While the Emergency Fleet Corp. has assisted some new companies to obtain equipment, the government's policy seems to be to concentrate such equipment as is available in the near future in the expansion of existing plants.

The Baltimore Dry Dock & Ship Building Co.'s recent order for eight shipbuilding cranes, placed with the Edward F. Terry Co., and for seven electric traveling cranes, placed with Manning, Maxwell & Moore, marked the conclusion of one of the largest shipbuilding crane negotiations lately in the market. The Newport News Ship Building & Dry Dock Co.'s recent inquiry for 11 bridge cranes and three gantry cranes remains pending, as does also the same company's inquiry for punching and shearing machinery, radial drills and other equipment. The Trenton Ship Building Co., 17 Battery place, New York, is drawing plans for a shipyard near Chester. Nothing has developed recently in connection with the Submarine Boat Corp.'s reported plan to build a shipyard on Newark bay, in conjunction with the Lackawanna Bridge Co. The American Bridge Co. is understood to have taken bids on its proposed plant at Newark bay, but has made no announcement as to its plans. The William Cramp & Son's Ship & Engine Building Co., Philadelphia, is reported to be considering important extensions, but its requirements have not yet reached the market in a formal inquiry. The Chile Exploration Co.'s inquiry for 20 electric traveling cranes remains active. The Southern Pacific railroad, through its offices at 165 Broadway, New York City, has closed for two 25-ton, one 10-ton, one 7½-ton and one 5-ton electric traveling cranes. The New York Central railroad is inquiring for locomotive cranes. The West Virginia Pulp & Paper Co. has closed for a 15-ton electric traveling crane for its Williamsburg, Pa., plant. The Union Iron Works, San Francisco, has closed for about $200,000 worth of ship and turbine-building machinery. This business was placed with eastern builders. The Fore River Ship Building Corp., Quincy, Mass., has issued an inquiry for nine boring mills and one large heavy-duty planer. The Erie Forge Co. and the American Brake Shoe & Foundry Co. have entered the market for a wide line of equipment. Inquiries from steel plants for replacement and filling-out purposes have reached good proportions, and it is thought some heavy business will be concluded from these sources.

The general machinery market was rather quiet last week. Neither shellmakers nor aeroplane motor builders showed as much activity as had been in evidence in previous weeks. Several leading machine tool builders again announced price advances, amounting to 10 per cent for sensitive drills and turret lathes; 5 per cent for grinders and 15 per cent for radial drills. Deliveries on boring mills now average about a year with most builders; milling machines, eight to 10 months; shapers, four to five months; lathes, 24-inch and larger, eight or nine months; radial drills, three or four months; some tools, such as turret lathes and sensitive drills can be obtained for practically immediate delivery.

Pacific Coast Shipbuilders Seek Tools in Chicago

INQUIRIES from shipbuilders for general machine shop equipment, including lathes, milling machines and shapers, in addition to large machines such as heavy boring mills and large planers have aroused interest among Chicago machine tool dealers. A Pacific coast shipbuilder has sent an inquiry for equipment to Chicago through a Portland, Oreg., dealer. In general, the buying in this market has been confined to small lists of tools which constitute a large volume of business. The Chicago & Northwestern railroad has practically closed on its list for 101 tools, which was published in the June 21 issued of THE IRON TRADE REVIEW. The Illinois Central railroad has about completed the purchase of tools for which it inquired several weeks ago. Advances of from 10 to 15 per cent on all lines of tools have been announced. Machine tool dealers in the Chicago district anticipate greatly increased activity in buying on all lines of tools within the next 60 days. At present, however, buyers seem to be waiting for more definite information in regard to the wants of the government for the production of munitions and appurtenances of warfare. Shellmakers have almost entirely withdrawn from the market and any buying which is related to the production of war materials is by manufacturers supplying equipment for the various camps. Manufacturers are planning few extensions for which machine tool equipment is necessary. The Illinois Engineering Co., Chicago, maker of vacuum heating materials and steam specialties for power plants, plans to erect a 100 x 118-foot building. The United States Wire Mat Co., Decatur, Ill., will build a 2-story factory, and the Cambria Spring Co., Los Angeles, will build an addition to its automobile spring department. A 1-story foundry and enameling works is planned by the Whiting-Mead Commercial Co., Los Angeles. An addition 200 x 300 feet for the manufacture of airplane motors will be built by the Nordyke & Marmon Co., Indianapolis.

Water works improvements and extensions are planned by a large number of cities in the western

AGATHON Alloy STEELS

In the plant of the Central Steel Company STEEL is not merely STEEL.

We look beyond the glowing furnaces and roaring mills—beyond the mass of metal itself.

To us it represents the safety of human life, the efficient transportation of freight, the economical operation of machines upon which depend the production of many necessities of modern civilization.

Agathon Alloy Steels are manufactured to an ideal, the highest standard of excellence the world has ever known—the ideal of the Ancient Grecians.

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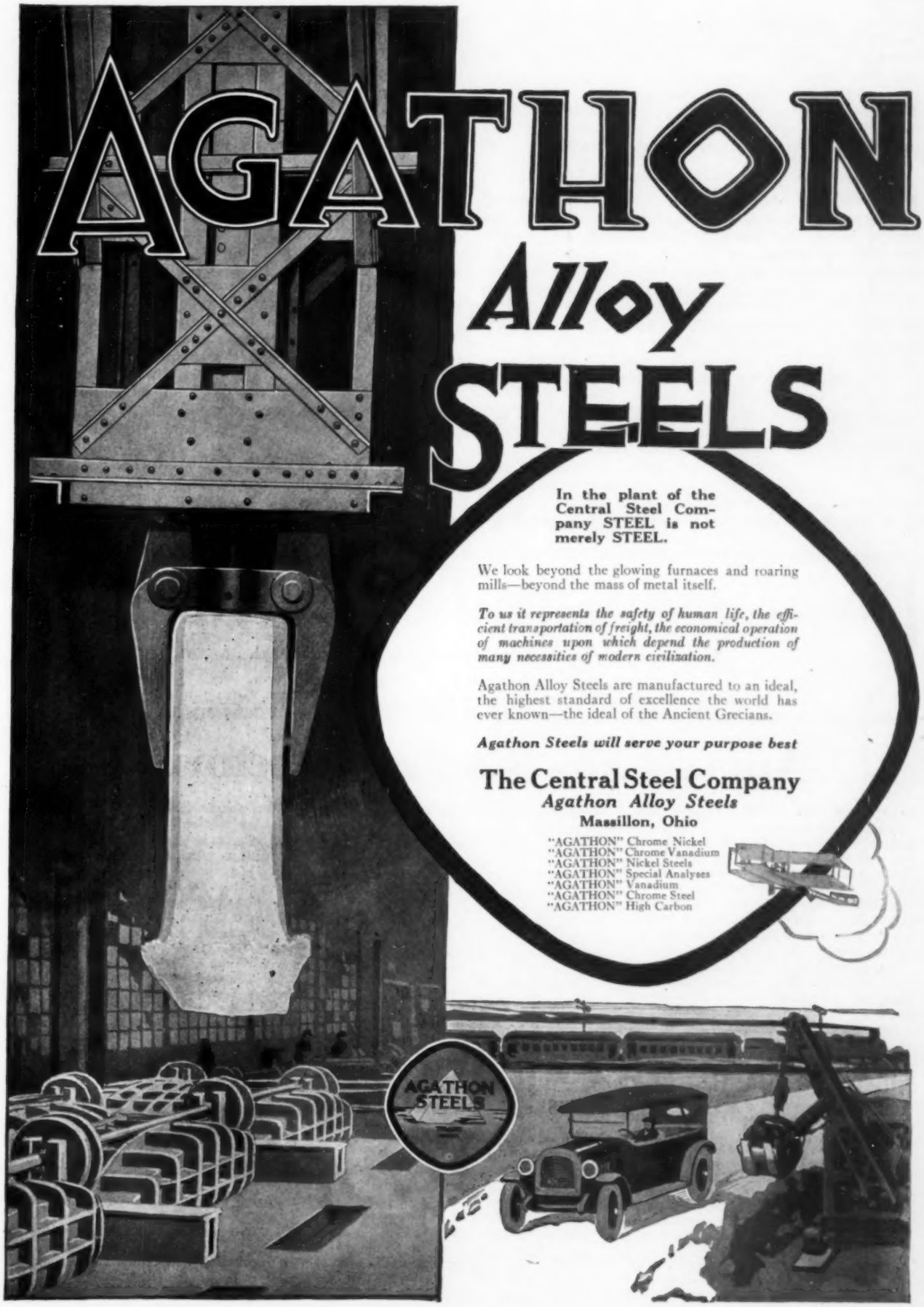
"AGATHON" Chrome Steel
"AGATHON" High Carbon



and southern states. The city of Duluth plans to install a 25,000,000-gallon, electrically-operated centrifugal pump. Port Arthur, Texas, has completed plans and will take bids soon for waterworks extensions for which a $180,000 bond issue has been authorized. The Yazoo & Mississippi Valley railroad will build an 8-stall roundhouse, power house, machine shop and water-supply system to cost about $150,000.

Cleveland Second-Hand Situation Acute

INQUIRIES continue to come into the Cleveland machine tool market in increasing volume. Automobile plants in Cleveland have entered the market for shop equipment and several companies manufacturing munitions have made tentative inquiries for replacement purposes. The second-hand situation in Cleveland is occupying the attention of local dealers to an even greater degree than formerly. There are few first-class second-hand tools available. This shortage not only affects the small machines, but heavy engineering tools as well, and inquiries for large-type heavy-duty equipment cannot be filled. Canadian interests have entered the local market with unusual frequency during the last 10 days and several heavy lists have been placed with local dealers. On page 54 is a list which was issued recently by the A. R. Williams Co., Toronto. This company's requirements are for engineering tools exclusively and it is believed by local dealers that considerable difficulty will be experienced in purchasing the equipment needed. Deliveries on lathes up to 20 inches are becoming more normal than at any time in the last six months. Shipping dates on large-swing lathes remain stationary. New York and Chicago tool dealers have announced price revisions, but as yet no increase has been officially declared by Cleveland houses. It is thought that price changes will be made shortly.

Shellmakers are Buyers

DEFINITE inquiries for munition-making equipment are more numerous in the Pittsburgh district. Several shellmakers already have taken large contracts from the government and have closed for additional equipment. Other munition manufacturers, who have received tentative contracts, are negotiating for machine tools of various types. The Erie Forge Co., Erie, Pa., is in the market for a number of large lathes, and the Westinghouse interests likely will buy additional equipment for the manufacture of munitions at an early date. The Pennsylvania railroad has completed plans for a new tank shop at Altoona, Pa., and is asking bids on a list of about 25 tools of miscellaneous types. The Ashland Iron & Mining Co., Ashland, Ky., has closed for two 15-ton cranes with the Cleveland Crane & Engineering Co., Wickliffe, O. The Youngstown Sheet & Tube Co., Youngstown, O., is reported to have placed contracts for seven or eight cranes for steel works extensions.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

ADDISON, ME. — The Frye & Flynn Shipbuilding & Drydock Co. has been incorporated to take over the Nash and Plummer shipyards by E. M. Frye and Carl B. Flynn, Harrington, Me. It has a contract for two of the government-planned cargo carriers.

AUBURN, ME.—Plans will be ready about July 12 for a 1-story, 75 x 85-foot building for the First Auburn Trust Co., at Court and Auburn streets.

PORTLAND, ME.—The Sanford Mills, Inc., care of George Clark, master mechanic, has plans for a 1-story, 100 x 200-foot mill building.

SPRINGFIELD, VT.—The Jones & Lamson Machine Co. is building an addition to its machine shop, to be 125 x 400 feet.

BOSTON.—The American Crucible Co. has been incorporated to deal in materials used in the melting of metals with $150,000 capital by Lyon Weyburn, William McKee and V. H. Mayr.

BOSTON. — The Uphams Corner Theater Co. has let the contract for a 2-story, 77 x 90-foot store and office building and a 30 x 189-foot theater to cost $260,000 and located at 543-545 Columbia road, Dorchester, Mass.

BOSTON.—The Evatt Construction Co. has been awarded the contract for a 6-story, 180 x 300-foot storehouse, with 63 x 180-foot wing, to cost $500,000, for the United States government at the Charlestown navy yard.

BOSTON.—The H. G. Butt Mfg. Co. has been incorporated to make machinery specialties, patterns, etc., with $10,000 capital by Herbert G. Butt, G. M. Somes, and F. C. Letteney.

BROCKTON, MASS.—The Tuck Mfg. Co. has been incorporated to make tools, springs and hardware specialties with $20,000 capital by Lon Weston, Lawrence G. Weston and M. G. Weston.

HOLDEN, MASS.—Fire ruined the tannery of I. Gordon & Son, Boston, recently, causing a loss of $60,000.

HOLYOKE, MASS.—The Crocker division of the American Writing Paper Co. has let the contract for a brick, 3-story, 44 x 75-foot factory to cost $25,000. The Gill division has let a contract for reconstruction work to cost $250,000, including new machinery and equipment.

MARLBORO, MASS.—The Koehler Mfg. Co. has been incorporated to make lighting appliances with $50,000 capital by Henry G. Powning and Walter S. Field.

SOUTHBRIDGE, MASS. — The Hamilton Molding Co. has awarded the general contract for a boiler house, 39 x 49 feet, to cost $10,000, to E. D. Ward, 82 Foster street.

SPRINGFIELD, MASS. — The Spencer Screw Co. has been incorporated with $10,000 capital by A. M. Spencer, George C. Robert and J. B. Beauvais.

WORCESTER, MASS.—Jacob Berwick has let the contract for a brick, 1-story, 55 x 132-foot factory at 3 May street.

WORCESTER, MASS.—McDermott Bros. will build a brick, mill construction, 6-story, 51 x 70-foot storage building to cost $30,000 in the rear of 182 Main street.

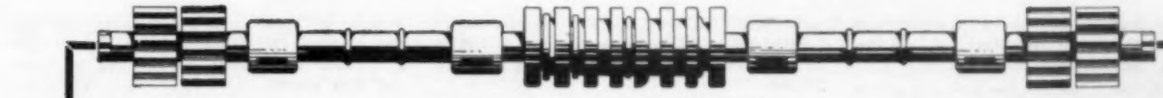
WORCESTER, MASS.—The New England Power Co. will build an addition to its plant to cost $100,000, and a new station in North Adams, Mass., to cost $75,000. Its Pawtucket and Woonsocket, R. I., plants are to be enlarged at a cost of $225,000. The company plans to expend $7,000,000 in the next two years. A new station will be built in Vermont.

WATERTOWN, MASS. — The Norcross Bros. Co., Boston, has the general contract for a projectile machine shop to cost $215,000, for the government. Work has been started on a 72 x 200-foot smith shop for the government by the same company.

WINCHESTER, MASS.—The Hanlon Locomotive Sander Co. and the Hanlon Gauge Glass Co. have been incorporated to make railroad supplies with $10,000 capital each, by James W. Russell and John H. Hanlon, Somerville, Mass.

NEWPORT, R. I.—The W. G. Cornell Co., New York and Washington, has been awarded the contract to build a steel, fireproof, 1-story power plant and make other improvements to cost $350,000 for the United States government at the naval training station.

PROVIDENCE, R. I.—The Rhode Island



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FURNACE
Now Ready.

Who wants the Entire Production of it for Ingots or Shell Blanks?

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

Foundry & Machine Co. has been incorporated with $100,000 capital by Henry S. Chafee, Dwight R. Bartlett and Samuel Raynor.

BRIDGEPORT, CONN. — Fire ruined the plant of the Paterson Forge Co., East Main street, recently, causing damage of $12,000.

BRIDGEPORT, CONN. — The American Tube & Stamping Co. has let the general contract for a steel factory building at 766 Stratford avenue and a 50 x 100-foot addition to its steel works.

BRIDGEPORT, CONN. — The Bridgeport Projectile Co. will build a 1-story, 90 x 200-foot addition to its plant to fill an order for 500 3-inch guns for the United States government.

BRIDGEPORT, CONN. — The Lake Torpedo Boat Co. has let the contract for a 1-story, 80 x 100-foot foundry and a 1-story, 20 x 30-foot composition building to cost $21,000.

GREENWICH, CONN.—The Forbes Mfg. Co. has been incorporated to make machine tools with $50,000 capital by Ewing M. Forbes, Raymond E. Pearsall and A. W. Marshall.

NORTH CANAAN, CONN. — The New England Slag Co. has been incorporated with $10,000 capital by John R. Strain and Abram W. Herbst.

PORTLAND, CONN. — The Gildersleeve Ship Construction Co. has been incorporated with $100,000 capital by Alfred Gildersleeve, Oliver Gildersleeve, and B. C. Stone, Middletown, Conn.

WATERBURY, CONN. — The Mill Engineering & Construction Co. has been awarded the contract for $539,000 for a 3-story, 196 x 199-foot high school for the city at Grove and Pine streets.

WATERBURY, CONN. — The George L. Lilley estate will build a 5-story, 110 x 140-foot business block at West Main and Leavenworth streets.

WATERBURY, CONN. — The Waterbury Gas Light Co., 83 Center street, will build a gas plant. Tracy Bros. Co. has the general contract.

WATERBURY, CONN. — The Waterbury Rolling Mills, Inc., will erect three plant additions to be 23 x 66, 64 x 150 and 32 x 151 feet. Tracy Bros. Co. has the general contract.

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—The Sweetser & Bainbridge Metal Alloy Co. has been incorporated with $10,000 capital to make metal alloys and metallic compounds by S. P. Sweetser, E. F. Bainbridge and H. G. Batcheller.

BATAVIA, N. Y.—The Massey-Harris Elevator Co. has been chartered with $3,000,000 capital by P. E. Verity, E. C. Atwater and G. E. Lown.

BROOKLYN, N. Y.—The Robert J. Rose Power & Chemical Corp., capital $10,000, will manufacture dyes, colors and chemicals. J. J. Rose, J. J. Bloomer and C. E. Hanson, 458 Eastern Parkway, are the incorporators.

BROOKLYN, N. Y.—Alexis Witte, 1204 East Eighteenth street, has drawn plans for a 1-story plant, to be 30 x 149 feet and cost $9,000.

BROOKLYN, N. Y.—Barker & Co. have awarded the general contract for a 100 x 100-foot foundry to cost $75,000, to Robbins Ripley & Co., 50 Church street, New York.

BROOKLYN, N. Y.—John Mulstein, 211 Third avenue, will build a 1-story, 60 x 97-foot shop, to cost $12,000.

BUFFALO.—The Trumpfheller Mfg. Corp. will build a 1-story addition to its plant, 28 x 50 feet.

BUFFALO. — The Schoelkopf Analine & Chemical Works, 351 Abbott road, will build a 2-story plant, 31 x 42 feet, to cost $7,500.

BUFFALO.—The Kellogg Structural Steel Co., 31 Stone street, has drawn plans for a 1-story shop, 55 x 150 feet, to cost $10,000.

KINGSLAND, N. Y. — The Bridgeman, Smith Co., 487 Kent avenue, New York, is having plans prepared for a paper box factory to cost about $250,000.

LOCKPORT, N. Y.—The United Paper Board Co. will build a 1-story, 100 x 100-foot power house.

MONTOUR FALLS, N. Y.—The Shepard Crane & Hoist Co. will build a 1-story, 45 x 90-foot machine shop addition.

MARINERS ISLAND, N. Y.—Joseph E. Dobbs, 767 East 220th street, New York, has the general contract for a 1-story power house, 75 x 150 feet, for the Staten Island Shipbuilding Co.

NEW YORK. — The Pioneer Engineering Corp., newly organized with $25,000 capital, will manufacture electric lamps and mechanical appliances. E. W. Picker, D. C. and H. C. Conkling, 80 Maiden Lane, are the incorporators.

NEW YORK.—The Manhattan Brass Co. has let the general contract for a 7-story plant to the C. A. Cowen Co., 30 East Forty-second street.

NEW YORK.—The Willard Storage Battery Co. has let the general contract for a $100,000 plant to Steen & Symes, Inc., 30 Church street.

NEWTON FALLS, N. Y. — The Newton Falls Paper Co. has drawn plans for a hydro-electric power plant to cost $50,000.

NEW YORK.—The Howden Co. has been chartered with $500,000 capital to make boilers and marine engines by J. Reid, A. H. Michel and W. S. Reynolds, 348 West Forty-eighth street.

NEW YORK.—The Atlantic Welding Co has been incorporated in New Jersey with $100,000 capital by Joseph L. Leuber, R. J. Watterson and W. M. Messersmith.

NEW YORK.—The World Harvester Corp., capitalized at $1,500,000 and incorporated in Delaware, will manufacture mechanical devices operated by electricity. D. Halley Bar-

Many Trade Changes Are Announced

The offices of the Metals Production Equipment Co., New York, have been removed from 105 West Fortieth street to the City Investing building, 165 Broadway.

The Mitchell-Tappen Co., manufacturing contractor, has removed its offices from 50 Broad street to 15-17 John street, New York.

Heinrich J. Freyn, Inc., has removed to larger quarters at 643-653 Peoples Gas building, Chicago. The name of the firm has been changed to Freyn & Co.

The Columbia Steel & Shafting Co., Pittsburgh, in order to facilitate its services to the government has opened an office at 338 Munsey building, Washington. Joseph T. Somers, district manager of sales, will act as special representative of the company.

The Sizer Forge Co., Buffalo, has opened a sales office at 111 Broadway, New York. J. A. Gibney Jr., is in charge.

A new office has been opened by the John Eichleay Jr., Co., steel construction, at 418 Oliver building, Pittsburgh. The main office of the company is at South Twentieth and Wharton streets.

The Superior Steel Co., Carnegie, Pa., by C. H. Forster, secretary-treasurer, advises that the name of the company has been changed to Superior Steel Corp.

Offices of L. A. Green, rails, machinery and equipment for mills, mines and contractors, have been removed from suite 1610 to suite 1405 First National Bank building, Pittsburgh.

The Brown Portable Elevator Co. will hereafter be known as the Brown Portable Conveying Machinery Co., a change necessary because of the nature of its products. No change will be made in the officers, or the policy of the company.

The New York offices of the General Electric Co. have been removed from 30 Church street, to the Equitable building, 120 Broadway. The entire twentieth floor has been fitted and furnished for the company's use.

Fairbank & Co., Cleveland, dealers in iron ore, pig iron, coal, coke and limestone, and newly organized by George L. Fairbank, have opened offices at 19-20 Wade building.

The Ross Power Equipment Co., Merchants Bank building, has been appointed Indianapolis representative of the Lincoln Electric Co., Cleveland, manufacturer of electrical apparatus.

The Asbestos Protected Metal Co., Pittsburgh, has temporarily closed its offices at Atlanta, Ga., and St. Louis, due to the enlistment of J. R. Nichols and F. C. Esterby, managers of the Atlanta and St. Louis offices, respectively.

Joseph Joseph & Bros. Co., Chicago, Ill., has removed its offices from the Railway Exchange building to larger quarters at 1830 McCormick building.

A New York City branch office has been opened by the Mahr Mfg. Co., Minneapolis, manufacturer of oil burning equipment, at 120 Liberty street. John R. Matthews is in charge.

The corporate title of the Southern Illinois Machine & Foundry Co., Murphysboro, Ill., has been changed to that of Egyptian Iron Works.

The Keel Boat Trade on the Mohawk.

Without it our West would not have developed until the advent of the Railroad, and without the early growth of the West, what would our land be today? When the first settlers spread inland from the seaboard, the keel boat followed them, bringing the goods they needed and carrying back their furs and wheat.

This was small package freighting, and it meant the breaking up of bulky shipments at Albany, just as the Federal Export Corporation has to do today to get its goods into the remote places of the world. In this work, our experience in packing is a deciding factor with the customer, as it insures the receipt of his order in the condition that he wants it, for transportation by canoe or mule pack. And remember that the bulkiest mine equipment is carried into locations where a wagon cannot travel. It is the "Know How" of packing that accomplishes this.

Our service covers the entire export field. We operate our own ships, we sell the goods we transport, and we finance them in the way the customer is accustomed to. We believe this comprehensive service will go far toward permanently establishing American products in the foreign markets. Your co-operation in supplying the goods we require, will be to your benefit as well as ours.

FEDERAL EXPORT CORPORATION

115 Broadway, New York, N. Y.

SHIPOWNERS EXPORTERS BANKERS

ber, Herbert E. Monahan and others are the incorporators.

NEW YORK.—The Dalton Mfg. Co. has been organized with $750,000 capital to make machinery and ventilating apparatus by A. Krenkel, H. A. Mossler and C. H. Purdy, 102 Convent avenue.

NEW YORK.—E. D. Anderson, Inc., has been incorporated in Delaware with $1,000,000 capital to manufacture machinery of all kinds by Arthur W. Britton, Joseph F. Curtin and Harry B. Davis.

NEW YORK.—The Wisconsin Brass Corp. has been incorporated with $20,000 capital to manufacture brass and sheet tubes, bars, rods,

Heavy Inquiry For Equipment

A. R. Williams, Toronto, Can., has issued a list of machines which will be purchased as soon as bids are made. This inquiry calls for the following tools:

One 90-inch x 20-foot open-side planer.

One 84-inch x 20-foot wall-type traveling tool head planer.

One 72-inch x 20-foot open-side planer.

One 48-inch x 16-foot standard planer with side heads.

Two 84-inch standard boring mills.

One 42-inch boring mill.

Two 7-foot plain radial drills.

Three 6-foot plain radial drills.

One 16-foot gap or pit lathe.

One 1-inch keyseater.

One 48-inch x 24-foot sheared-head engine lathe.

One horizontal boring, milling and drilling machine with 5-inch spindles.

One 24-inch slotter.

One 12-inch slotter.

Six plain milling machines, one No. 1½, one No. 2, two No. 3 and two No. 4.

Two No. 5 vertical milling machines.

Three 3-foot plain radial drills.

One 3-foot to 4-foot plain radial drill.

Four 24-inch to 36-inch x 10-foot to 12-foot planers without side heads.

Three 24-inch vertical boring mills.

Three 36-inch vertical boring mills.

One No. 7 horizontal cylinder-boring machine.

One No. 5 horizontal cylinder-boring machine.

One 16-inch x 84-inch plain grinder.

disks and wire by R. Victor, A. D. Ridley and E. H. Green, 49 Wall street.

NEW YORK.—The Central Battery Corp., capitalized at $600,000, has been chartered to make electric batteries and to engage in a business as general electrical engineers by H. S. Johannsen, P. Platou and J. B. Wardwell, 120 Broadway.

NEW YORK.—The American Die & Tool Works, Inc., capital $25,000, has been organized for the manufacture of dies, tools and automatic machines. G. L. Goshco, C. Wassill and J. Lucher, 2173 Pacific street, Brooklyn, are the incorporators.

NIAGARA FALLS, N. Y.—The National Electrolytic Co. will build a 1-story heating plant. The engineer in charge is S. Firestone, Granite building, Rochester.

PORT RICHMOND, N. Y.—The Staten Island Shipbuilding Co., 1 Broadway, New York, plans to build a $40,000 addition to its shop and a $25,000 addition to its foundry.

POUGHKEEPSIE, N. Y. — The Wallace Co., 333 Main street, will build a heating plant to cost $25,000.

ROCHESTER, N. Y.—The Sargeant Motor Co., newly organized with $50,000 capital, will make motors and accessories. A. W. Sergeant, F. H. Peabody and E. W. Hadley are the incorporators.

ROCHESTER, N. Y.—Herman H. Meyering and J. M. Bowman will erect a plant for lithographing to cost $30,000.

SYRACUSE, N. Y.—The L. Scusa Machine & Tool Co., capital $10,000, will engage in a general machinery business by L. and L. and N. Scusa.

TROY, N. Y.—The Ross Valve Mfg. Co. has been chartered with $40,000 capital to make valves and other specialties by J. C. and A. and W. Ross.

ALLENTOWN, PA.—The Allentown Boiler Works, Inc., has been chartered for the manufacture of boilers and equipment by Charles Collum and others. The company is capitalized at $35,000.

ALLENTOWN, PA.—The Lehigh Valley Power Co. will build a 1-story, 67 x 70-foot boiler house addition to cost $40,000. Engineers Ford, Bacon & Davis, 115 Broadway, New York, are taking bids.

CARLISLE, PA.—Federal Equipment Co. will build a 3-story, 40 x 65-foot addition. A. M. Prexendorf is in charge.

COATESVILLE, PA. — Bonds valued at $36,000 have been sold for improvements to the water works system. W. E. Greenwood is in charge.

CONFLUENCE, PA.—The Castleman River Smokeless Coal Co. plans coal mine, light and water development. Plans have been drawn.

ERIE, PA.—The Metric Metal Co. will build a 1-story machine shop, 100 x 112 feet.

ERIE, PA. — The Saxer-Creider Machinery Co. has been organized to manufacture machinery with $10,000 capital by W. D. Creider, et al.

HAMBURG, PA.—W. M. Neimen and L. K. Saul will build a 1-story, 50 x 200-foot foundry addition to cost $10,000.

NEW BRIGHTON, PA.—The Wire Drawing Machine Co., capitalized at $100,000, recently has been incorporated to make machinery by Albert H. Miller, Samuel A. McCullough and M. B. Houck.

PHILADELPHIA.—Architect Charles Casper, 925 Chestnut street, is taking bids on a 1-story, 44 x 50-foot boiler house, to cost $100,000, for F. A. Poth & Sons.

PHILADELPHIA.—Warren Moore & Co. have taken the general contract for a 1 story, 225 x 500-foot foundry, to cost $500,000, for the navy department.

PHILADELPHIA.—The Montgomery Iron & Steel Co. has been granted a permit for a 1-story, 50 x 113-foot shop, at American and York streets.

PHILADELPHIA. — Ballinger & Perrot have finished plans for a 110 x 161-foot, and a 61 x 216-foot building at Long Island City, for the Patterson-Sergeant Co.

PITTSBURGH.—The Sotter Brass Foundry Co. has beeen incorporated with $10,000 capital by Charles J. Sotter and others.

SOUTH BETHLEHEM, PA.—The Lattig Shimer Mfg. Co. will build a 1-story, 40 x 100-foot plant.

STEELTON, PA. — The Bethlehem Steel Co., South Bethlehem, plans a 4-story, 60 x 400-foot reinforced concrete addition.

WILKESBARRE, PA. — The Wilkesbarre Silk Co. will build a machine shop and stair tower to cost $12,000.

CAMDEN, N. J.—The William Cramp & Sons Ship & Engine Building Co., Philadelphia, will construct a bridge across the Delaware river at Camden to its Petty's island shops.

CAMDEN, N. J.—The Electric Cushioned Armor Co., recently incorporated with $125,000 capital, is to manufacture machinery. George Brooks, William H. Kilmore and Samuel Hough are the incorporators.

CAPE MAY, N. J.—A contract has been let to Cramp & Co., Philadelphia, for the construction of a cantonment camp here for the United States government.

DOVER, N. J. — The New Jersey Slag Products Co., capitalized at $50,000 and recently incorporated, will buy and crush slag from furnaces. E. G. Lewis, F. K. Sheesley and A. D. P. Janney of Baltimore, Md., are the incorporators.

ELIZABETH, N. J.—The Linden Tanning

A Narrow Policy

An inquiry reached a Cleveland machine tool dealer recently for a 72-inch x 72-inch x 20-foot, 4-head motor-driven planer, for a Canadian shipyard and urgent delivery was requested. The equipment was listed at $9000 by the seller. The machine was inspected and O. K.'d by the buying commission and tentative negotiations were concluded for its purchase. When it was found that Canada retained its tariff and that the tool instead of costing $9000 plus the freight to destination would cost the initial sum plus an import duty of approximately 40 per cent, the purchase was not made.

The Canadian government apparently does not as yet regard shipbuilding enough of a war activity to justify special dispensation in removing any obstacles to its expansion.

Co. has purchased four acres on South Second street and will erect a $250,000 addition.

JERSEY CITY, N. J.—The Charles V. Hoffman Co., capitalized at $25,000, will equip boiler rooms, power houses, etc. C. V. Hoffman, L. W. Guernsey and C. F. Payton, Flemington, are the incorporators.

JERSEY CITY, N. J.—The Zealandia Co., capitalized at $5000, will make mill machinery. G. H. Jarvis, Philip L. Neieser and J. Frank Turner are the incorporators.

JERSEY CITY, N. J.—Thomas Henderson & Co., 14 Cliff street, New York, have drawn plans for a 3-story, 50 x 100-foot chemical plant to cost $20,000.

NEW BRUNSWICK, N. J.—The county engineer is preparing plans for a steel drawbridge over the Delaware and Raritan canal. The estimated cost of the structure is $50,000.

RAHWAY, N. J.—The Rahway Chemical Mfg. Co. has been incorporated with $25,000 capital to manufacture chemicals, etc., by I. S. Joseph, G. H. Adler and J. B. Eiseman.

NEW CASTLE, DEL.—Fire at the Baldt works of the Penn - Seaboard Steel Corp. caused by a furnace cave-in, resulted in a $40,000 loss.

WILMINGTON, DEL. — The Lipman Re-

Milwaukee Electric Crane & Mfg. Co.

The Milwaukee Crane

Embodies

All Safety Features

Simplicity
Accessibility
Interchangeability
Enclosed Gears
Automatic Lubrication

Milwaukee Electric Crane & Mfg. Co.

NEW YORK
50 Church St.

PITTSBURGH
704 Empire Bldg.

MILWAUKEE
WIS.

frigerator Car & Mfg. Co. has been chartered for the manufacture of refrigerator cars with a capital of $1,000,000. F. D. Buck, M. L. Horty and K. E. Longfield are the incorporators.

WILMINGTON, DEL.—The Virginia Chlorine Products Corp. has been incorporated with $1,500,000 capital to make dyes, chemicals, etc., H. Van Arsdale, Newark, C. J. Kulberg, New York, and D. A. Woodcock, Passaic, are the incorporators.

BALTIMORE. — The Maryland Chemical Co. will build a 3-story plant, warehouse and power plant to cost $30,000.

BALTIMORE. — The Consolidated Gas Light & Power Co., care of J. R. Laizaux, Monument and Constitution streets, has plans in preparation for a 100 x 125-foot boiler house to cost $200,000.

CURTIS BAY, MD.—The Standard Guano Co., George A. Whiting, president, has let the general contract for a $500,000 plant including a power house, to the Whiting-Turner Construction Co., Baltimore.

NORFOLK, VA.—The bureau of yards and docks, navy department, Washington, has drawn plans for a coal-handling plant.

PORTSMOUTH, VA.—The Seaboard Air Line has awarded the general contract for a 1-story, 100 x 249-foot shop to cost $50,000, to W. E. Morgan, Savannah, Ga.

Activities in the Central States

BARKDALE, WIS. — The DuPont Powder Co. will erect a new finishing plant adjacent to its present holdings. F. T. Beers is general superintendent.

MILWAUKEE. — The George H. Smith Steel Casting Co. has purchased a parcel of land from the Milwaukee Forge & Machine Co. for a consideration of $12,000.

MILWAUKEE. — The Kearney & Trecker Co., manufacturer of milling machines, has started work on the erection of a shop addition 50 x 285 feet. The office building also is being enlarged.

MILWAUKEE.—The Hercules Steel Casting Co., incorporated several months ago with $350,000 capital, and maintaining offices at 501 Free Press building, is receiving estimates on two 20-ton direct current cranes with 70-foot span, and one 10-ton outside crane of 100-foot span. E. B. Gennrich is secretary.

MILWAUKEE. — A 2-story manufacturing addition, 55 x 137 feet in size, will be erected by the Geuder, Paeschke & Frey Co. The work is in charge of Klug & Smith, consulting engineers, Mack block. The company manufactures sheet metal goods, enameled ware, automobile stampings, etc.

RACINE, WIS.—The Belle City Mfg. Co., agricultural instruments and farm machinery, has awarded contracts for the construction of a 1-story brick and steel machine shop and foundry addition 50 x 120 feet.

TOMAHAWK, WIS. — Bascom & Tully, consulting engineers, Madison, Wis., have submitted plans to the common council for improvements to the water works system. The estimated cost is about $15,000.

DETROIT.—Fire damaged the plant of the M. S. Gear Co. recently.

DETROIT.—The Hoensheid Steel Treating Co. has been incorporated with $100,000 capital to manufacture and treat metals.

DETROIT. — The National Process Fuel Co. has been organized with $100,000 capital by Frank E. Pabst, Wellington S. Wells and Charles A. Willmarth.

DETROIT. — The American Steel Process Co., capital $5000, has been incorporated by Alfred A. Lauppe, Fred Knodel and Clark C. Seeley.

DETROIT.—Plans are being prepared by Smith, Hinchman & Grills for a 17-story building, 196 x 216 feet, for the Michigan State Telephone Co.

GRAND RAPIDS, MICH.—The Sampson Trailer Co. has started construction work on a 1-story, 95 x 150-foot factory to cost about $35,000.

JACKSON, MICH.—The General Machine & Tool Co., capital $24,000, is to engage in the manufacture of machinery and tools. The incorporators are: Louis Paul, P. W. Rogers, J. W. Myers and others.

MONROE, MICH.—The Monroe Silica Co. has been incorporated with $100,000 capital by J. D. Ford, H. R. Browne, et al. The company will make brick, handle sand, stone, etc.

CHICAGO.—The Pheoll Mfg. Co. has purchased a 1-story factory building at Twelfth and Waller streets, containing approximately 40,000 square feet of floor space.

CHICAGO.—The Apex Electric Mfg. Co. has purchased a site at West Fifty-ninth and Bishop streets, adjacent to its present plant, which will be reserved for future extensions.

EAST CHICAGO, IND.—The East Chicago Foundry Co. has been incorporated with a capitalization of $30,000. Harry C. Stuart, Henry S. Evans, P. S. Graver and William F. Graver are the incorporators.

KOKOMO, IND. — The Kokomo Aircraft Co. has been chartered with $100,000 capital by George Kingston, C. J. Davies and others to engage in the manufacture of aircraft.

PERU, IND.—The Weigle Machine Tool Co. has been incorporated with $115,000 capital by Harry B. Fox, G. E. Meek, A. P. Weigle, M. F. Gartland and Thomas Ryder.

AKRON, O.—The Goodyear Tire & Rubber Co. experienced a loss of $40,000, when building No. 22 was damaged by fire.

CANAL FULTON, O.—The plant of the Kenova Mine Car Co., Kenova, W. Va., has been purchased by the Fulton Pit Car & Mfg. Co. The plant of the former company is not yet completed.

CINCINNATI.—The Davenport Paper Box Co. has had plans drawn for a 4-story, 100 x 156-foot factory building to cost about $100,000.

CLEVELAND. — Parsons & Parsons plan to erect a 60 x 124-foot building to be used as a machine shop.

CLEVELAND. — The Osborn Engineering Co. is working on plans for an office building for the National Tool Co.

CLEVELAND.—The Osborn Engineering Co. is preparing plans for a manufacturing plant to be built for the Firestone Tire & Rubber Co., Akron, O.

CLEVELAND.—The Warner & Swasey Co. has let a contract to the Crowell-Lundoff-Little Co. for the construction of a 1-story machine shop, approximately 200 x 200 feet, to cost about $60,000.

CLEVELAND.—The Park Drop Forge Co. has filed an application for a permit to erect a $25,000 machine shop approximately 60 x 325 feet.

CLEVELAND.—The Ohio Blower Co. has acquired additional property making its holdings approximately 310 x 608 feet. A 4-story, $100,000 structure, 60 x 200 feet, the first unit of its new plant, has been completed.

CLEVELAND.—The Trelectric Mfg. Co., capitalized at $25,000, has been organized for the manufacture of electrical appliances. William C. Tregonning, J. A. Boyden, W. K. Stanley, Fred J. Young and H. N. Pettibone are the incorporators.

CLEVELAND.—The Hibbard Co. has been chartered with $25,000 capital to make refrigerating machines by M. Y. Yost, H. W. Hibbard, S. Chester Crobaugh and others.

CLEVELAND.—The Kremer-Cummins Machine Co. has been incorporated with a capitalization of $15,000 by Robert W. Kremer, Robert R. Cummins, Charles L. Stocker, F. W. Stanton and Jesse A. Fenner.

CLEVELAND. — The American Steel & Wire Co. will erect a coal storage plant, a coal handling plant and a 1-story mill building with crane, at a total expenditure of $58,250.

COLUMBUS, O. — The Ram Engineering Co. has been incorporated with $25,000 capital by Josiah E. Matthews, J. W. Anderson, Robert L. McCabe, Adam P. Stewart and John G. Dun.

IRONTON, O.—The Ironton Firebrick Co., capitalized at $20,000, has been organized by H. A. Marting, E. O. Marting, A. C. Steece, C. C. Hayward and F. E. Hayward.

MIDDLETOWN, O.—Harry Engel is organizing a company to build and operate a new foundry in the village of Trenton.

TOLEDO, O. — The Taylor Coupler & Castings Co. is completing a new building, 60 x 126 feet, and plans to erect a second building soon.

LOUISVILLE, KY.—Fire did considerable damage to the engine room of the Wirth, Land & Borgel Co., recently.

LOUISVILLE, KY. — Mason, Hanger & Co., Richmond and Lexington, Ky., have been awarded the contract for erection of the federal army mobilization camp at Louisville. They will shortly open an office in Louisville and call for bids. Cost estimates on the camp approximate $5,000,000.

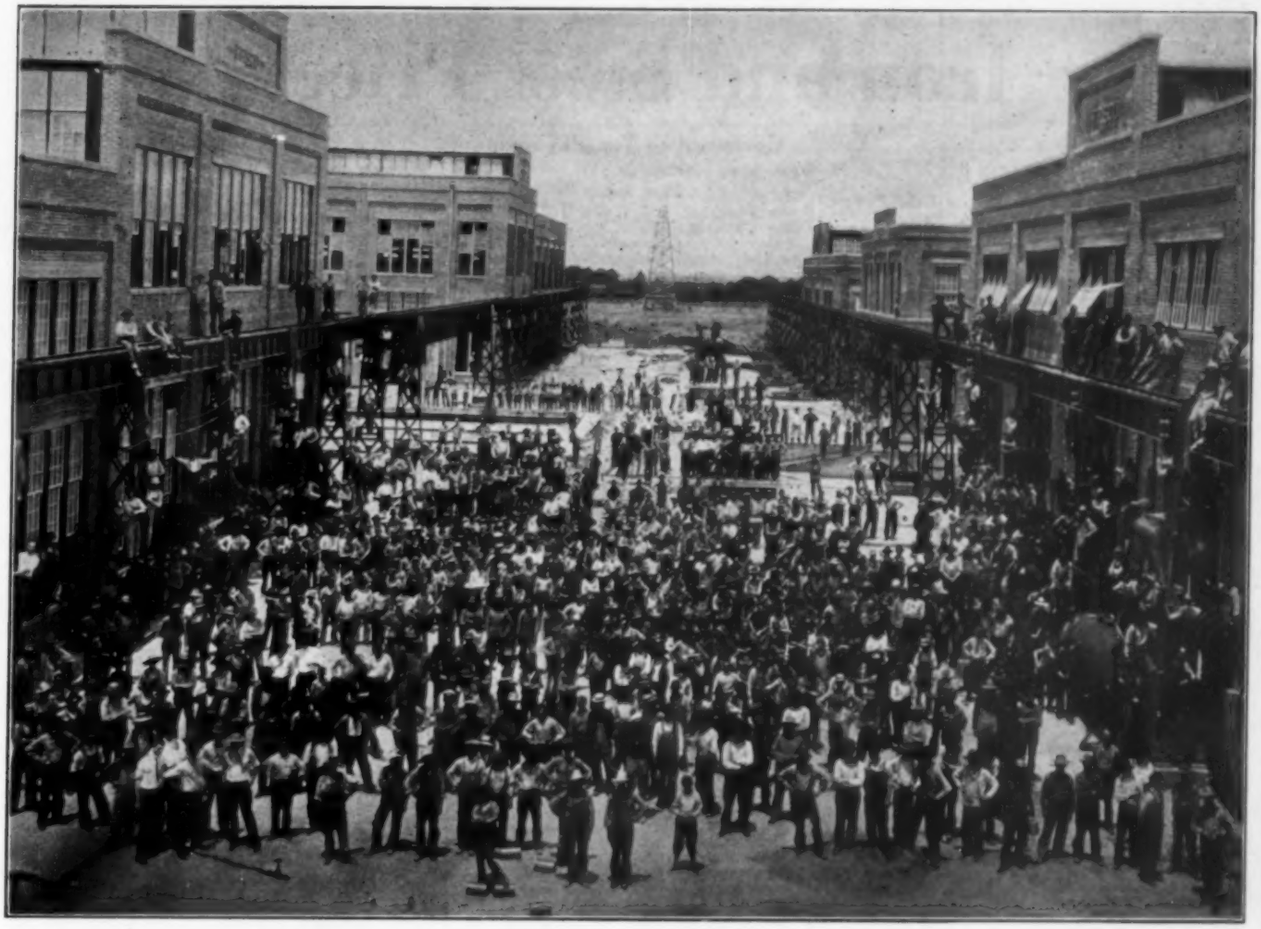
PADUCAH, KY. — The city commission contemplates improvements to the municipal lighting plant at a cost of $52,000. An additional $40,000 will be spent on the distribution system. Two 300-kilowatt generators are to be purchased.

BELLE, W. VA. — The Charleston Alloy Steel Co. recently has been incorporated with $500,000 capital by J. M. Payne, Beckley Minor Jr., J. F. Bouchelle, E. A. McCoy and G. P. Brennan.

CHARLESTON, W. VA.—The bureau of yards and docks, navy department, Washington, will take bids soon on a projectile plant to cost $2,100,000, to be located here.

New Catalog

AIR TIGHT BLAST GATES. — A new type of air tight blast gate to control the air supplied to oil and gas furnaces, blacksmith forges, blast pipes, miscellaneous blowing operations, heating and ventilating work, etc., has been put on the market by the W. S. Rockwell Co., 50 Church street, New York. This gate is made of a casing in two parts containing a slide operating entirely within the casing. The slide is made of hard rolled brass and moves in a machined runway with just enough clearance to permit movement. The face of each half of the casing is also machined, thus forming an air-tight joint. The slide is moved by a handle which extends outside the casing through a stuffing box. The casing is tapped for standard wrought iron pipe or may be provided with nipples for connecting with sheet iron pipe.



NOON HOUR ON THE JOB

Here are twelve hundred men of forty trades working harmoniously and efficiently under an organized plan. They were assembled in four weeks, and in five months an entire plant, under eight acres of roof, was completed, ready for operation

Organization An Important Factor In Efficient Building Operations

If you were called upon or found it necessary to build a complete industrial plant costing upwards of a million dollars in five months' time, how would you go about it? How many "man-days" would be required for each class of work to accomplish this result? How would you arrange for your deliveries of materials and apparatus to insure their arrival upon the site at *exactly* the right time to avoid rehandling or the more vital delay? Where would you find the men of proven skill in their various crafts to direct and to actually do the work? How would you group, parallel, or arrange for proper sequence of operations so as to save time and duplication of equipment; minimize conflict of effort and materially reduce construction costs in a multitude of ways open to the initiated?

This photograph illustrates one instance where a *good answer* was found in retaining an experienced and reliable firm as **"Engineers-Constructors"** for the complete plant—buildings and equipment—*thereby annexing for the brief period required a highly specialized organization for this specific purpose,* centralizing in one competent source entire responsibility for not only the building, but the design of the complete property. The owners saved themselves needless worry and delay—*securing immediate construction activity*—and a lot of money, for they paid only a reasonable fee upon the actual cost of construction labor and materials and not an architect's profit upon a general contractor's profit, upon a sub-contractor's profit, upon a greater cost of actual construction—because of division of effort and responsibility. If contemplating factory building operations, *you* can secure these results by communicating with us—our attention and proposition can be had for the asking, and it will be worth your while to ask.

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL

CHICAGO: 105 South La Salle Street **NEW YORK: 111 Broadway**

Iron and Steel Prices

Corrected to Tuesday noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.

Old range Bessemer, 55 iron	5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

Port Henry Ores, non-Bessemer, Per Unit,

Delivered Eastern Pennsylvania.

Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75

WAREHOUSE PRICES

Steel bars, Chicago	4.50c
Steel bars, Cleveland	5.00c
Steel bars, Detroit	4.50c
Steel bars, Philadelphia	5.00c to 5.50c
Steel bars, New York	5.00c
Steel bars, St. Louis	4.55c
Steel bars, Cincinnati	4.65c
Steel bars, St. Paul	4.60c
Steel bars, over 2-in., Buffalo	4.50c
Steel bars, Buffalo	4.40c
Iron bars, Chicago	4.50c
Iron bars, Cleveland	4.95c
Iron bars, Detroit	4.50c
Iron bars, St. Louis	4.45c
Iron bars, Cincinnati	4.65c
Iron bars, Philadelphia	5.00c
Iron bars, New York	5.00c
Shapes, Chicago	5.00c
Shapes, Detroit	5.00c
Shapes, St. Louis	5.05c
Shapes, St. Paul	5.10c
Shapes, New York	5.25c
Shapes, Cleveland	5.25c
Shapes, Philadelphia	5.00c to 5.50c
Shapes, Buffalo	4.60c
Shapes, Cincinnati	5.00c
Plates, Chicago	8.00c
Plates, Detroit	8.00c
Plates, St. Louis	7.05c
Plates, St. Paul	7.10c
Plates, New York	9.00c
Plates, Cleveland	7.50c
Plates, Philadelphia	9.50c to 10.00c
Plates, Cincinnati	9.00c
No. 10 blue anl. sheets, Chi.	9.50c
No. 10 blue anl. sheets, Cleve.	9.50c
No. 10 blue annealed, Buffalo	4.50c
No. 10 blue anl. sheets, St. L.	9.55c
No. 10 blue anl. sheets, Cinci.	9.50c
No. 10 blue anl. sheets, St. Paul	9.60c
No. 10 blue annealed, Detroit	8.00c
No. 28 black sheets, Chicago	9.50c
No. 28 black sheets, Cleve.	9.50c
No. 28 black sheets, Cincin.	8.15c
No. 28 black, Detroit	8.00c
No. 28 black sheets, St. L.	9.55c
No. 28 black sheets, St. Paul	9.60c
No. 28 galv. sheets, Chicago.	11.00c
No. 28 galv. sheets, Cleve.	11.00c
No. 28 galv. sheets, Cincin.	10.15c
No. 28 galvanized, Detroit	11.00c
No. 28 galv. sheets, St. L.	10.40c to 11.25c
Hoops, Cleveland	6.00c
Hoops, Detroit	6.00c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$26.00 to 27.00
Bundled sheets, Cleveland	25.00 to 27.00
Bundled sheets, Buffalo	16.50 to 17.00
City wrought, short, N. Y.	35.00
Frogs, switches, guards, St. L.	40.00 to 42.00
Heavy melting steel, Pitts.	44.00 to 45.00
Heavy melting steel, Buffalo	40.00 to 41.00
Heavy melting steel, Chicago	37.50 to 38.00
Heavy melt'g steel, Cleveland	41.00 to 43.00
Heavy melting steel, Cinci.	37.50 to 38.00
Heavy melting steel, east. Pa.	39.00 to 40.00
Heavy melt'g steel N. Y.	35.00 to 36.00
Heavy melting steel, St. L.	44.00 to 45.00
Heavy melt'g steel, Birming.	24.00 to 26.00
Hydraulic pressed sh'ts, Cleve.	30.00 to 31.00
Hydraulic press. sheets, Pitts.	35.00
Hydraulic pressed sh'ts, Chgo.	30.00 to 30.50
Low phos. steel, Buffalo	50.00 to 55.00
Low phos. steel, Pittsburgh	55.00 to 60.00
Low phos. steel, eastern Pa.	56.00 to 58.00
Shoveling steel, Chgo.	35.00 to 35.50
Shoveling steel, St. Louis	36.00 to 37.50
Steel rails, short, Chicago	50.00 to 51.00
Steel rails, short, Cleveland	44.00 to 45.00
Steel rails, short, St. Louis	45.00 to 47.00
Steel rails, old, Birmingham	30.00 to 31.00
Stove plate, Cincinnati	19.75 to 20.00
Stove plate, St. Louis	22.00 to 23.50
Stove plates, N. J. points	22.00
Stove plate, Birmingham	18.00 to 19.00
Stove plate, Buffalo	18.00 to 18.50
Stove plate, eastern Pa.	23.00 to 24.00
Stove plate, Pittsburgh	25.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	27.00 to 28.00
Boiler plate, cut, No. 1, St. L.	24.00 to 25.00
Bundled sheet, Cincinnati	23.00 to 23.50
Knuckles, coup., Chicago	43.00 to 44.00
Knuckles, coup., St. Louis	36.00 to 37.00
Springs, Chicago	44.00 to 45.00
Stove plate, Chicago	21.50 to 22.50
Stove plate, Cleveland	20.00 to 21.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54

Buffalo to:

Albany, N. Y.	$1.26
New England (rail)	2.58
New York and Brooklyn (rail)	2.58

Virginia furnaces to:

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Ala., to:

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	4.25
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40

Chicago to:

Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54

Duluth, Minn., to:

Minneapolis-St. Paul	$1.25

Mayville, Wis.:

Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama	61.0 cents

IRON MILL USE

(Gross Tons)

Busheling No. 1, Buffalo	27.00 to 28.00
Busheling, No. 2, Buffalo	18.00 to 19.00
Busheling, No. 1, Pittsburgh	27.00 to 28.00
Cast borings, New York	21.50 to 22.00
Cast borings, eastern Pa.	22.00 to 22.50
Cast borings, Buffalo	14.50 to 15.00
Cast borings, Pittsburgh	23.00 to 25.00
City wrgt., long, New York	40.00
Forge flashings, small, Cleve.	30.00 to 31.00
Forge flashings, large, Cleve.	30.00 to 31.00
Forge, No. 1, eastern Pa.	26.00 to 28.00
Grate bars, Buffalo	18.00 to 18.50
Grate bars, N. J. points	20.00
Iron axles, Pittsburgh	55.00 to 60.00
Iron axles, Cincinnati	46.00 to 46.50
Iron axles, eastern Pa.	50.00 to 55.00
Iron axles, Buffalo	50.00
Iron rails, Chicago	46.00 to 47.00
Iron rails, Buffalo	29.50 to 30.00
Iron rails, Cincinnati	36.00 to 36.50
Iron rails, St. Louis	46.00 to 47.50
Iron rails, Cleveland	45.00 to 47.00
Machine turnings, Buffalo	17.00 to 18.00
Machine shop turnings, N. Y.	20.00
Mach. shop turnings, Pitts.	23.50 to 25.00
Mch. shop turnings, east. Pa.	21.50 to 22.00
Machine turnings, Birming.	12.00 to 13.00
R. R., mch. cast, No. 1, Buff.	30.00 to 31.00
R. R. wrought, 1, Buffalo	44.00 to 45.00
R. R. wrgt., No. 1, east. Pa.	55.00 to 60.00
R. R. wrought, No. 1, Pitts.	45.00 to 50.00
R. R. wrought, 1, B'ham.	31.00 to 32.00
Wrought pipe, Buffalo	31.00 to 32.00
Wrought pipe, eastern Pa.	40.00 to 42.00
Wrought pipe, New York	38.00

(Net Tons)

Angle bars, iron, Chicago	$46.00 to 47.00
Angle bars, steel, St. Louis	39.00 to 40.00
Arch bars & transoms, St. L.	44.00 to 45.00
Arch bars & transoms, Chgo.	47.00
Busheling, No. 1, Chicago	31.00 to 32.00
Busheling, No. 1, Cincinnati	22.00 to 22.50
Busheling, No. 1, Cleveland	26.00 to 27.00
Busheling, No. 1, St. Louis	27.50 to 28.50
Busheling, No. 2, Chicago	22.00 to 23.00
Cast borings, Cincinnati	14.00 to 14.50
Cast borings, Cleveland	21.00 to 22.50
Cast borings, St. Louis	17.00 to 17.50
Cast borings, Chicago	18.50 to 19.00
Cut forge, Chicago	38.00 to 39.00
Grate bars, Cleveland	20.50 to 21.50
Iron axles, St. Louis	49.00 to 50.00
Iron axles, Chicago	52.00 to 52.50
Iron axles, Cleveland	52.00 to 53.00
Machine shop turnings, Chgo.	19.00 to 19.50
Mach. shop turnings, Cleve.	17.00 to 18.00
Machine shop turn'gs, Cinci.	14.00 to 14.50
Mach. shop turnings, St. L.	18.50 to 19.00
Pipes and flues, Cleveland	28.00 to 29.00
Pipes and flues, Chicago	29.00 to 30.00
Pipes and flues, St. Louis	25.00 to 25.50
Railroad wrought, 1, Cleve.	43.00 to 44.00
Railroad wrgt., No. 1, Chgo.	40.00 to 41.00
Railroad wrought, 1, Cinci.	36.00 to 36.50
Railroad wrought, 1, St. L.	40.00 to 41.00
Railroad wrgt., No. 2, Chgo.	38.00 to 39.00
Railroad wrought, 2, St. L.	38.00 to 39.00

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$23.00 to 24.00
Axle turnings, Buffalo	22.00 to 23.00
Shafting, New York	50.00
Shafting, eastern Pa.	48.00 to 52.00
Steel car axles, Birmingham	40.00 to 41.00
Steel car axles, New York	58.00
Steel car axles, Buffalo	50.00
Steel car axles, Cleveland	54.00 to 55.00
Steel car axles, Pittsburgh	55.00 to 60.00
Steel car axles, eastern Pa.	50.00 to 55.00

(Net Tons)

Shafting, St. Louis	39.00 to 40.00
Steel car axles, St. Louis	49.00 to 50.00
Steel car axles, Chicago	50.00 to 51.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	$42.00 to 45.00
Car wheels, (steel), Pitts.	50.00
Car wheels, Chicago	39.00 to 40.00
Car wheels, eastern Pa.	33.00 to 35.00
Car wheels, Buffalo	31.00 to 32.00
Car wheels, New York	33.00 to 35.00
Car wheels, St. Louis	36.00 to 36.50
Car wheels, Birmingham	30.00 to 31.00
Car wheels, Cleveland	34.00 to 35.00
Tram car wheels, Birming.	27.00 to 28.00
Cast, 1, heavy, N. J. points.	35.00
Cast, 1 machy., N. J. points	40.00
Cast, No. 1, eastern Pa.	39.00 to 41.00
Cast, No. 1, Pittsburgh	35.00 to 38.00
Cast, No. 1, Birmingham	28.00 to 29.00
Malleable railroad, Cincinnati	21.50 to 22.00
Malleable railroad, Cleveland	37.00 to 38.00
Malleable railroad, Buffalo	34.00 to 35.00
Malleable railroad, Pittsburgh	30.00 to 32.00
Malleable railroad, east. Pa.	32.00 to 34.00

(Net Tons)

Cast No. 1, Cleveland	32.00 to 33.00
Cast, No. 1, Chicago	32.50 to 33.00
Cast, No. 1, Cincinnati	29.00 to 29.50
Cast, No. 1, St. Louis	30.00 to 31.00
Malleable railroad, Chicago	34.00
Malleable railroad, St. Louis	27.00 to 28.00
Malleable agricultural, Chgo.	27.00 to 28.00

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	50.00 to 55.00
Reroll. rails, 5 ft. & ov., Chgo.	49.00 to 50.00
Reroll. rails, 5 ft. & ov., E. Pa.	50.00 to 55.00
Reroll. rails, 5 ft. & ov., St. L.	50.00 to 55.00
Reroll. rails, 5 ft. or ov., Cleve.	46.00 to 47.00
Rerolling rails, long, Birming.	40.00 to 41.00

(Net Tons)

Boiler punchings, Chicago	41.50 to 42.00
Locomotive tires, Chicago	50.00 to 51.00
Locomotive tires, St. Louis	47.00 to 48.00